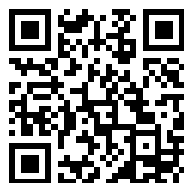

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

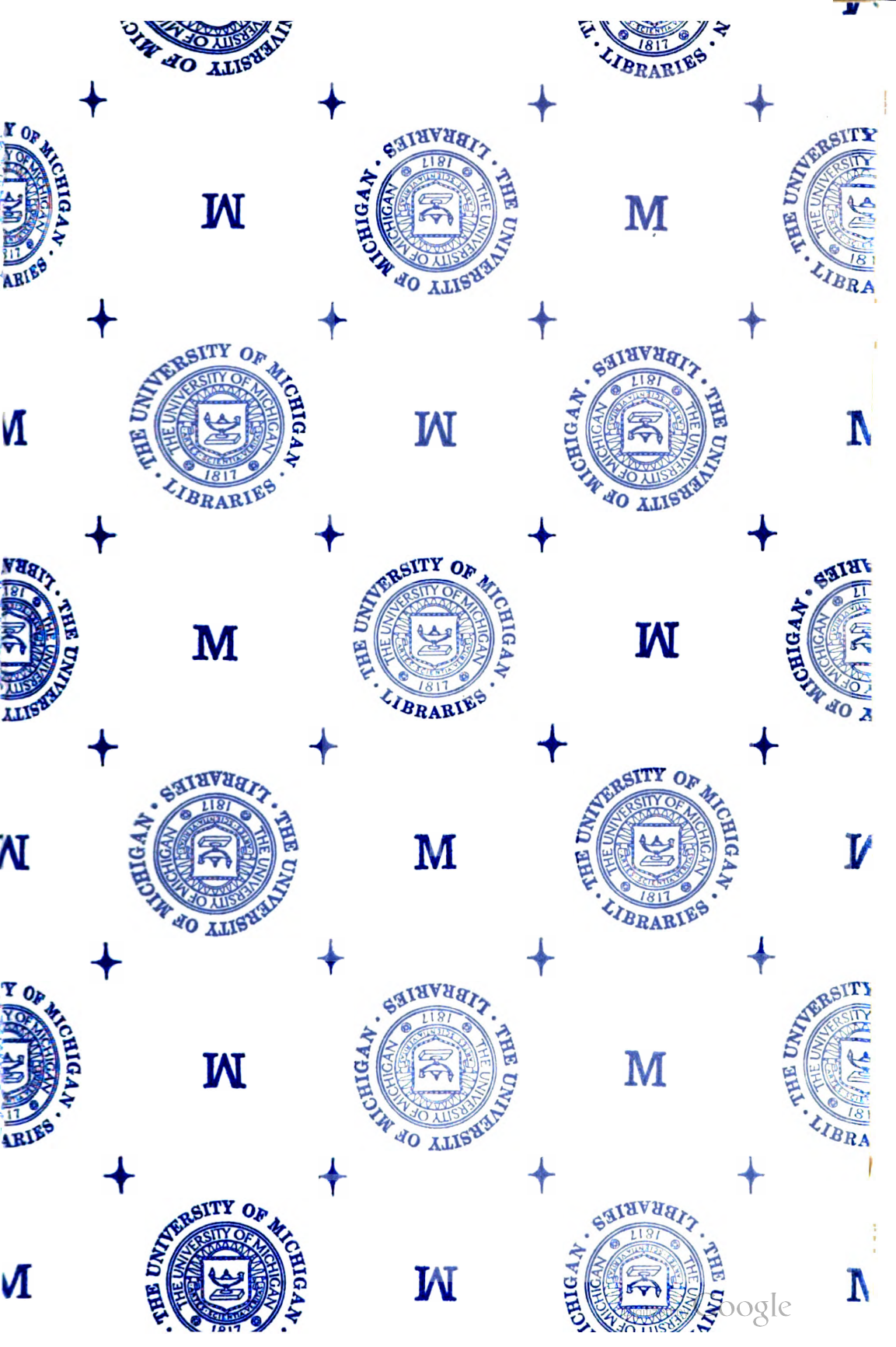
Google™ books

<https://books.google.com>



B 339845





0 0 0

SAILING DIRECTIONS
FOR THE
WEST COASTS OF FRANCE,
SPAIN, AND PORTUGAL.

FROM USHANT TO GIBRALTAR STRAIT,
WITH
THE AFRICAN COAST FROM CAPE
SPARTEL TO MOGADOR.

FIFTH EDITION.

PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF THE ADMIRALTY.

LONDON:
PRINTED FOR THE HYDROGRAPHIC OFFICE, ADMIRALTY,
BY DARLING & SON, LTD., 1-3, GREAT ST. THOMAS APOSTLE, E.C.;
AND SOLD BY
J. D. POTTER, AGENT FOR THE SALE OF ADMIRALTY CHARTS.
81 POULTRY, AND 11 KING STREET, TOWER HILL.
1891.

Price Four Shillings.

For further information the
Hydrographic Notice No. 1
should also be purchased.

482.000 5.1

VK
798
G7

by transfer

1916

C. C. Dec. 5/94

500
Chicago
Lib. 5/94

ADVERTISEMENT

TO

FIFTH EDITION.

THE Sailing Directions for the West Coasts of France, Spain, and Portugal were originally compiled in 1867 by Staff Commander J. Penn. The coast of France being derived from the valuable surveys made by M. Beautemps Beaupré, between the years 1818-26, and the more recent charts published by order of the French Government. The Coast of Spain from the well known works of Tofiño; and the Derrotero de la Costa Septentrional de España, 1860-61.

The general features of the Coast of Portugal were derived principally from the work of M. M. Franzini, as translated by Captain W. F. W. Owen, R.N., 1814; the directions for the Rivers Douro and Tagus being from the most recent surveys. The Strait of Gibraltar chiefly from the Manuel de la Navigation dans le Dédroit de Gibraltar, 1857, and the Derrotero General del Mediterráneo, 1860.

The second edition, prepared by Lieutenant Dawson, R.N., and published in 1873, contained also, a description of the coast of Africa, between cape Spartel and Mogador.

The third edition was revised in 1880, by Staff Commander Hitchfield, of the Hydrographic Department.

The fourth edition, with an Appendix, was published in 1885.

The present edition has been prepared by Navigating Lieutenant C. W. Baillie, R.N., from various sources, including the most recent surveys undertaken by the respective Governments; also the Ports Maritime de la France 1879 and the Derrotero de la Costa Septentrional de España y Portugal, 1880.

With a view to the general interests of Navigation, it is hoped that officers, both of the Royal Navy and Mercantile Marine, will transmit to the Hydrographer of the Admiralty notice of errors or omissions which may come under their observation, and also any fresh information they may obtain.

By the publication of this work, all Hydrographic Notices relating to the former editions, and all Notices to Mariners, inclusive of No. 82 of 1891, are cancelled.

W. J. L. W.

Hydrographic Office, Admiralty, London.

March 1891.

SO 10809-3000-12/88 Wt 17596 D & S.

a 2

CONTENTS.

CHAPTER I.

	Page.
West Coast of France; principal ports; lights; signals; buoys and beacons	1-5
North and North-West Coasts of Spain; principal ports; telegraphs ...	6, 7
Coast of Portugal; principal ports; railways; telegraphs; signals ...	7
South Coast of Spain; principal ports	8
Bay of Biscay; soundings; winds and weather; barometer; currents; caution	9-14
Passages	15-18

CHAPTER II.

USHANT TO ILE DE GROIX.

Ushant or d'Ouessant. The passage du Fromveur, and islands and dangers bounding its south-east side	19-27
Chaussée des Pierres Noires. Chenal du Four	27-34
Chenal de la Helle. The new channel into the Four	35, 36
The Iroise; anchorages; lights; dangers	36-41
Brest. The Goulet or entrance to Brest. Rade de Brest, buoys	41-45
Anse de Camaret. Baie de Douarnenez. Pointe du Raz... ..	46-50
The Chaussée de Sein or Saints. The Raz de Sein	51-53
Port Audierne. The Penmarc'h rocks. The Glénan islands	54-59
Pont l'Abbé river. Odet or Quimper river. Baie de la Forest. Concarneau harbour	59-64
Quimperlé river. L'Ile de Groix	65, 66

CHAPTER III.

ILE DE GROIX TO FUENTERRABIA.

Port Louis and L'Orient. Plateau des Birvideaux	67-73
Belle-Ile. Quiberon bay. Passage de la Teignouse	73-77
Chaussée du Beniguet. Houat island. Passage du Beniguet. Haedik island. Plateau de la Recherche. River Crac'h. Le Croisic	77-83
Plateau du Four. River Vilaine. Chenal du Nord	83-88
River Loire. Nantes. St. Nazaire	88-95
Bourgneuf bay. Ile de Noirmoutier. Ile d'Yeu	95-99
Port Breton. Pointe de l'Aiguille. Port des Sables d'Olonne	99-105
Ile de Rê. Pertuis Breton. Ile d'Oleron. Pertuis D'Antioche and Basque road	106-112
La Rochelle, River Charente, Rochefort. Pertuis de Maumusson	112-116

	Page.
Plateau de Roche Bonne, River Gironde. Bordeaux	116-125
Passe du Nord. Passe du Sud. Bassin d'Arcachon. Fosse de Cap Breton	125-132
The River Adour. Bayonne. St. Jean de Luz bay	123-141

CHAPTER IV.

COAST OF SPAIN.—FUENTERRABIA TO CAPE PEÑAS.

Province of Guipuscoa; Fuenterrabia bay; winds. Port Passages ...	142-150
San Sebastian. Mount Hernio. Orio river. Saraus town	150-157
Guetaria bay. Sumaya inlet. Deva river. Port Motrico	157-162
Ondárroa bay. Weather and currents on the coast of Biscay. Sausaten bay	162-166
Lequeitio bay. Monte Otoyó or Alto de Lequeitio. Oguella bay. Ea bay. Ogoño anchorage	166-169
Cape Ogoño. Mundaca river. Cape Machichaco and bay	170-172
Cape Villano. Río de Plencia. Mount Lucero or Luzuero	173, 174
Bilboa bay and town. River Nervion. Somorrostro river. Winds and currents on the coast of the province of Santander	175-185
Castro-Urdiales castle and bay. Mount Cerredo and Candina. Oriñon inlet	185-188
Laredo. Mount Santana and inlet	188-194
Capes Quexo, Ajo, and Galizano. Santander	194-202
The Liencre heights. Pico de Mogro. Suances islands	202, 203
San Martín de la Arena or Suances. San Vicente de Luaña	203-207
Torriente and Luaña banks. Port Comillas. Cape Oyhambre	207-209
Meron sand. San Vicente de la Barquera. Mounts Escudo and Burgon ...	210-212
The Tinas inlets. Deva river	213, 214
Llanes. Palo de Pío islet. Niembro inlet. Cape Prieto	215-218
San Antolín beach. Cape Mar. Rivadesella harbour	218-221
Mount Carrandi. Cape Lastres. Tazones bay	221-223
Villaviciosa inlet. Gijón bay, town, &c.	223-231
Cape Torres. Candas bay. Port Luanco. Llumeras bay	231-234

CHAPTER V.

COAST OF SPAIN.—CAPE PEÑAS TO THE RIVER MIÑO.

Cape Peñas; dangers; winds and currents	235-238
River Avilés and bay. River Právia. Port Cudillero	238-243
Arledo bay. Port Luarca. River Navía. Port Vioveles	243-248
Porcia bay. Cape San Sebastian. Gulf of Foz. Rivadeo inlet	248-256
Farallones de San Cipriano and port; currents. Lago bay	256-258
Cape Morás. Vivero inlet. Barquero inlet. Estaca point	259-267
Cariño inlet. Port Santa Marta. Cape Ortegal	268-272
Port Cedeira. Cape Prior. Bermeo bank. Ferrol harbour	272-284
Ares and Betanzos inlets. Coruña bay	284-295
Sisargas islands. Cape Villano. Camariñas bay	295-300
Cape Toriñana. Cape Finisterre. Corcubion bay	300-309
Muros bay. Arosa bay. Ons and Onza islands	309-317
Pontevedra and Aldan bays. Cies or Bayona islands	317-323
Vigo bay. The River Miño	323-332

CHAPTER VI.

COAST OF PORTUGAL—RIVER MIÑO TO THE RIVER
GUADIANA.

	Page.
Lima river. St. Bartholomew rocks. Cavado river	333-335
Ave, Leça, and Douro rivers. Oporto	336-344
Vouga river. Cape and River Mondego. Peninsula of Peniche ...	344-351
The Burling or Berlenga island. Estéllas and Farilhoes islets ...	351-353
The Cintra mountains. Cape Roca. Cascaes bay	353-355
Lisbon. River Tagus. Cachopo shoals. Directions	355-366
Cape Espichel. Setubal or St. Ubes. Cape Sines	366-372
Gorringe or Gettysburg bank. Cape St. Vincent. Lagos. Villa Nova de Portimão. Faro	372-377
Cape St. Mary. Tavria. Guadiana river. Ayamonte. Pamarão ...	377-383

CHAPTER VII.

COAST OF SPAIN.—RIVER GUADIANA TO GIBRALTAR.

COAST OF AFRICA.—CEUTA BAY TO MOGADOR.

Piedras, Odiel, and Tinto rivers	382-385
Guadalquivir river. San Lucar de Barrameda. Cadiz	385-399
Coast between Cadiz and Cape Trafalgar	399-403
The Aceytera and Meca Shoals. Barbate bay	403-406
Bolonia bay. Mount San Bartolomeo. Val de Vaqueros bay ...	406
Sierre de Enmedio. Lances de Tarifa. Cabezos shoals	407-409
Tarifa. Camorro point. Tolmo bay. Frayle point	409-411
Carnero point. Pearl rock. Gibraltar bay. Algeciras	411-416
Palmones river. Mayorga. Gibraltar. Gibraltar anchorages ...	416-421
Cape Spartel. Judios bay	421-423
Tangier bay. Malabata point. Jaseur bank	423-427
Al Boassa, Alcazar, Cires, and Lanchones points. Peregril island ...	427-429
Sierra Bullones or Apes hill. Bensus bay. Marabut mountain ...	429-431
Ceuta bay. Santa Catalina point. Directions	431-437
Winds and weather in the Strait of Gibraltar. Tides and Currents ...	437-448
Jeremias anchorage. Arsila. El Araish. Rabat. Old and new Marmora. Fedalah cape	448-454
Dar el Beida cape. Azimur. Mazighan. North Cape Blanco. Cape Cantin.	454-458
Safi bay. Wad Tensift. Mogador	458-462
Mogador harbour, anchorage, road, current, winds, diseases ...	462-464

Index	465-508
List of Sailing Directions published by the Hydrographic Department of the Admiralty, 1890	509-514
List of Admiralty Agents for the sale of Charts in the United Kingdom ...	515
" " " " " abroad	516

**IN THIS WORK THE BEARINGS ARE ALL MAGNETIC,
EXCEPT WHERE MARKED AS TRUE.**

**THE DISTANCES ARE EXPRESSED IN SEA MILES OF
60 TO A DEGREE OF LATITUDE.**

**A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO
100 FATHOMS.**

**THE SOUNDINGS ARE REDUCED TO LOW WATER OF
ORDINARY SPRING TIDES.**

INFORMATION RELATING TO CHARTS, SAILING DIRECTIONS, AND THE GENERAL NAVIGATION OF H.M. SHIPS.

ON THE CORRECTION OF CHARTS, LIGHT LISTS, AND SAILING DIRECTIONS.

There are three descriptions of publications as guides to navigation—the charts, the sailing directions, and the light lists—which are all affected by the continual changes and alterations that take place.

Of these the charts should always be, so far as our knowledge permits, absolutely correct to date; and the light lists should be noted for the recent alterations, though space will not permit of full details being always inserted. The sailing directions, however, cannot, from their nature, be so corrected, and *in all cases where they differ from charts, the charts must be taken as the guide.*

Charts.—When issued to a ship on commissioning, the charts have received all necessary corrections to date. As sent from the Hydrographic Office they are, as a rule, fresh from the plates. They then receive such corrections by hand in the dépôts as are required, and are so issued to the ships.

All small but important corrections that can be made by hand are notified by Notices to Mariners, and should at once be placed on the charts to which they refer.

Large corrections that cannot be conveniently thus made are put upon the plates, and fresh copies are issued to the ships to replace the others, which are directed to be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which these large corrections are made are noted on the chart plates in the middle of the lower edge ; those of the smaller corrections at the left-hand lower corners.

In all cases of quotations of charts, these dates of corrections should be given, as well as the number of the chart, in order that at the Admiralty it may be known what edition of the chart is referred to.

The Light Lists, annually published at the beginning of each year, are not corrected in the dépôts before issue, but appendices are issued every two months, giving the alterations that have taken place, copies of which are put into the chart boxes.

It is the duty of the navigating officer when he receives the set of charts to make notations in the light lists from these appendices, and from the Notices to Mariners in the box ; and to keep them so corrected from time to time.

The Light Lists should always be consulted as to the details of a light, as the description in the Sailing Directions may be obsolete, in consequence of changes made since publication.

The Sailing Directions are not corrected before issue, except occasionally for very important new rocks or dangers. Hydrographic Notices and Supplements referring to each volume are published from time to time.

Supplements contain all the information received up to date since the publication of the volume to which they refer, and cancel all previous Hydrographic Notices.

Hydrographic Notices contain all information up to date since the publication of the volume, or since the last Supplement or Hydrographic Notice, but endeavour is made to issue no more than one of these affecting each volume, and, on the collection of fresh information, to include the former Notice in a Supplement.

The existence of Supplements or Hydrographic Notices is to be noted, in the tabulated form now being placed for the purpose inside the cover of each volume, in cases when such notations have not been made before issue, and also on receipt of further Notices after commission.

GENERAL NAVIGATION.

Notes should be made in the margin of the volume of sailing directions affected, as references to the Supplements or Hydrographic Notices when the latter are printed on both sides.

To enable the books to be more conveniently corrected, however, such Supplements and Hydrographic Notices as are of moderate size are now being printed on one side only, and two copies are issued to each ship ; one to cut up, the slips being pasted in at the appropriate place ; the other to retain intact for reference.

To make these notations or paste in these slips is one of the early duties of a navigating officer after drawing his box of charts and books, and similar notes are to be made from Notices to Mariners that may thereafter be received.

It must, however, be thoroughly understood that sailing directions will never be correct in all details, except up to the date of the last Hydrographic Notice or Supplement, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide ; for which purpose, for ordinary navigation, they are sufficient.

THE USE OF CHARTS AS NAVIGATIONAL AIDS.

Accuracy of a Chart.—The value of a chart must manifestly depend upon the accuracy of the survey on which it is based, and this becomes more important the larger is the scale of the chart.

To estimate this, the date of the survey, which is always given in the title, is a good guide. Besides the changes that, in waters where sand or mud prevails, may have taken place since the date of the survey, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail, and until a plan founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbours and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been

found. The fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

Blank spaces among soundings mean that no soundings have been obtained in these spots. When the surrounding soundings are deep it may with fairness be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch.

A wide berth should therefore be given to every rocky shore or patch.

Fathom Lines a Caution.—Except in plans of harbours that have been surveyed in detail, the five-fathom line on most Admiralty charts is to be considered as a caution or danger line against unnecessarily approaching the shore or bank within that line, on account of the possibility of the existence of undiscovered inequalities of the bottom, which nothing but an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the time required for such a detailed examination does not permit of its execution, nor do the necessities of the case demand it.

The ten-fathom line is, on rocky shores, another warning, especially for ships of heavy draught.

Charts where no fathom lines are marked must be especially regarded with caution, as it generally means that soundings were too scanty and the bottom too uneven to enable them to be drawn with accuracy.

Distortion of Printed Charts.—The paper on which charts are printed has to be damped. On drying distortion takes place, from the inequalities in the paper, which greatly varies with different paper and the amount of the original damping; but it does not affect navigation. It must not be expected that accurate series of angles taken to different points will always exactly agree, when carefully

plotted upon the chart, especially if the lines to objects be long. The larger the chart the greater the amount of this distortion.

Chart on largest scale always to be used.—It sometimes happens that, from press of work, only the copper plate of the larger scale chart of a particular locality can at once receive any extensive re-arrangement of coastline or soundings. This is an additional reason, besides the obvious one of the greater detail shown on a larger scale chart, why this largest scale chart should always be used for navigating.

Caution in using small Scale Charts.—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile. This is particularly to be observed when coming to an anchor on a narrow ledge of convenient depth at some distance from the shore.

For the same reason bearings to objects near should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

Lights.—All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of an observer's eye of 15 feet. The table in the Light List affords a means of ascertaining how much more or less the light is visible should the height of the bridge be more or less. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light at night, the fact is often forgotten that from aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the standard compass.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by remarking its order, as given in the Light List, and in some cases by noting how much its visibility in clear weather falls short of the range due to the height at which it is placed. Thus, a light standing 200 feet above the sea and only recorded as visible at 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles, if of any power. (*See table of distances visible, due to height, at end of Light List.*)

Fog Signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from wind, large areas of silence have been found in different directions and at different distances from the origin of a sound, even in clear weather. Therefore too much confidence should not be felt in hearing a fog signal. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly towards the land, and is not observed by the people at a lighthouse until it is upon them; whereas a ship may have been for many hours in it, and approaching the land. In such a case no signal may be sounded. When sound has to travel against the wind, it may be thrown upwards; in such a case, a man aloft might hear it when it is inaudible on deck.

Taken together, these facts should induce the utmost caution in closing the land in fogs. The lead is generally the only safe guide.

Tides and Tidal Streams.—In navigating coasts where the tidal range is considerable, caution is always necessary. It should be remembered that there are indraughts to all bays and bights, although the general run of the stream may be parallel to the shore.

The turn of the tidal stream off shore is seldom coincident with the time of high and low water on the shore. In open channels, the tidal stream ordinarily overruns the turn of the vertical movement of the tide by three hours, forming what is usually known as tide and half-tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

In crossing a bar or shallow flats, the table (B) at page 98 of the Tide Tables will be found of great assistance in calculating how much the water has risen or fallen at any hour of the tide.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can never be depended upon, and additional caution is necessary.

It should also be remembered that at times the tide falls below the level of low-water ordinary springs. This always occurs in temperate regions at the equinoxes, but wind may produce it at any time, and the amount varies with locality. When the moon's perigee coincides with the full or new moon the same effect is often produced.

Fixing Position.—The most accurate method of fixing a position relative to the shore is by angles between well-defined objects on the chart. All ships are now being supplied with a station pointer, and this method should be used whenever possible.

Two things are, however, necessary to its successful employment. First, that the objects be well chosen ; and second, that the observer is skilful and rapid in his use of the sextant.

For the former, reference can be had to the pamphlet on the use of the station pointer, which is in every chart box.

The latter is only to be obtained by practice.

It will readily be seen that in war time, when the compass may be knocked away, or rifle-fire may make it undesirable to expose the person more than necessary, a sextant offers great advantages, as angles can be obtained from any position whence the objects are visible. It is this contingency that makes it especially desirable that all navigating officers should become expert in this method of fixing a ship's position.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbours or narrow passages among mud banks, navigation by sextant and station-pointer is invaluable, as a true position can only be obtained by its means. A small error in either taking or plotting a bearing under such circumstances may put the ship ashore.

It is not intended that the use of the compass to fix the ship should be given up ; there are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed.

In all cases where great accuracy of position is desired, angles should invariably be used, such as the fixing of a rock or shoal, or of additions to a chart, as fresh soundings or new buildings. In all such cases angles should be taken to several objects, the more the

better ; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. In the case of ordinary soundings, it is only necessary to take a third angle now and then ; firstly, to check the general accuracy of the chart as above stated ; secondly, to make certain that the more important soundings, as at the end of a line, are correctly placed.

Sometimes, when only two objects are visible, a compass bearing and sextant angle may be used with advantage.

In passing near a point of land, or an island, the method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "four-point bearing," when the bearing is taken four points on the bow, and on the beam, the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives an excellent fix for a departure, but does not ensure safety, as the point, and probably the rocks off it, are abeam before the position is obtained.

By taking the bearings of two points and four points on the bow, a very good position is obtained before the object is passed ; the distance of the latter at the second position being, as before, equal to the distance run in the interval.

The use of a danger angle in passing outlying rocks with land behind should also not be forgotten. In employing this method, however, caution is necessary, as should the chart be not accurate, *i.e.*, should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

In fixing by the compass, it must always be remembered that two bearings only are liable to error. An absolute error may be made in either bearing observed ; errors may be made in applying the deviation ; or errors may creep in in laying them on to the chart. For these reasons, a third or check bearing of some other object should be taken, especially when near the shore or dangers. The coincidence of these three lines will prevent any mistakes.

The tripod now supplied to all ships to hold the lamp over the standard compass will be found of great service in fixing position at night, as by its aid a bearing can be as accurately taken as in

daylight. Its use in connection with ascertaining the change of bearing of an approaching ship's light should not be forgotten.

Amongst astronomical methods of fixing a ship's position, attention is drawn to the great utility of Sumner's method. A Sumner line, that is, a line drawn through the position (obtained by an assumed latitude and longitude by chronometer) at right angles to the bearing of the sun, as obtained from the azimuth tables, gives at times invaluable information, as the ship must be somewhere on that line. A deep cast at the same time may often serve to get an approximate position on the line. An early and very accurate position can be also obtained by Sumner's method, by getting longitude by a bright star at daylight when the horizon is well visible, and another longitude by the sun when a few degrees above the horizon. The Sumner lines drawn through the two positions thus obtained will, if the bearing of sun and star differ three points or more, give an excellent result.

Current Arrows on charts only show the most usual or the mean direction of a tidal stream or current. It must never be assumed that the direction of a stream will not vary from that indicated by the arrow. In the same manner, the rate of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

Change of Variation of the Compass.—The gradual change in the variation must not be forgotten in laying down positions by bearing on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are long, the displacement of position from neglect of this change, may be of importance. The compasses are re-engraved when the error amounts to a quarter of a point, but the chart plates cannot be corrected more frequently from the impossibility of making alterations too often on one spot in a copper plate.

The geographical change in the variation is in some parts of the world sufficiently rapid to need consideration. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles. The variation chart should be consulted on this head.

Use of Oil for Modifying the Effect of Breaking Waves.—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skilfully applied, may prevent much damage both to ships (especially the smaller classes) and to boats, by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows :—

1. On free waves, *i.e.*, waves in deep water, the effect is greatest.
2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain ; as nothing can prevent the larger waves from breaking under such circumstances ; but even here it is of some service.
3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use ; crude petroleum is serviceable when nothing else is obtainable ; but all animal and vegetable oils, such as waste oil from the engines have great effect.
4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.
5. It is useful in a ship or boat, both when running, or lying to, or in wearing.
6. No experiences are related of its use when hoisting a boat up in a sea-way at sea, but it is highly probable that much time and injury to the boat would be saved by its application on such occasions.
7. In cold water, the oil, being thickened by the lower temperature, and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.
8. The best method of application in a ship at sea appears to be : hanging over the side, in such a manner as to be in the water, small canvas bags, capable of holding from one to two gallons of oil, such bags being pricked with a sail needle to facilitate leakage of the oil.

The position of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—*e.g.*, from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying to, the weather bow and another position farther aft seem the best places from which to hang the bags, with a sufficient length of line to permit them to draw to windward, while the ship drifts.

9. Crossing a bar with a flood tide, oil poured overboard and allowed to float in ahead of the boat which would follow with a bag towing astern, would appear to be the best plan. As before remarked under these circumstances the effect cannot be so much trusted.

On a bar with the ebb tide it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current, and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil is diffused well ahead of the boat, and the bag can be readily hauled on board for refilling if necessary.

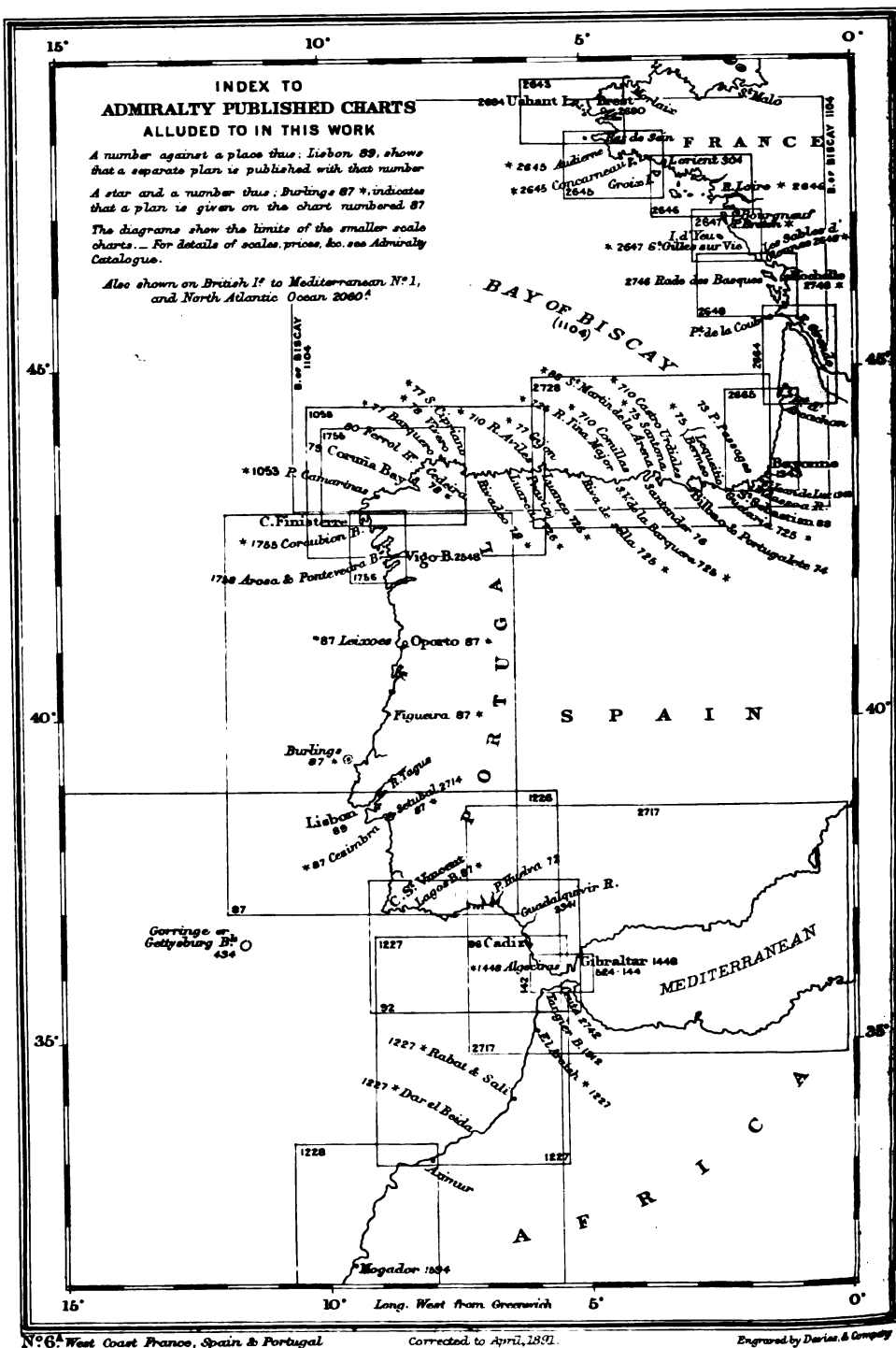
Local Magnetic Disturbance of the Compass on board Ship—The term “local magnetic disturbance” has reference only to the effects on the compass of magnetic masses external to the ship in which it is placed. Observation shows that disturbance of the compass in a ship afloat is experienced only in a few places on the globe.


Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases, that it would require a local centre of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong, the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centres near together.

The law which has hitherto been found to hold good as regards local magnetic disturbance is, that north of the magnetic equator the north end of the compass needle is attracted towards any centre of disturbance, and south of the magnetic equator it is repelled.

It is very desirable, that whenever a ship passes over an area of local magnetic disturbance, the position should be fixed, and the facts reported as far as they can be ascertained.





For later information respecting the lights which are described in this Work, seamen should consult the Admiralty List of Lights on the Western coasts of Europe and Africa from Dunkerque to the cape of Good Hope, &c. This List is published early in the current year, corrected to the preceding 31st December.

SO 10809.

SAILING DIRECTIONS

FOR THE

WEST COASTS OF FRANCE, SPAIN, AND PORTUGAL.

CHAPTER I.

GENERAL REMARKS ON THE WEST COAST OF FRANCE, NORTH AND NORTH-WEST COASTS OF SPAIN, COAST OF PORTUGAL. AND SOUTH COAST OF SPAIN.—BAY OF BISCAY.—SOUNDINGS.—WINDS AND WEATHER.—CURRENTS.—PASSAGES.

The WEST COAST of FRANCE, between Ushant and the Gironde river, varies in height, is broken, and skirted by numerous islands, rocks, and dangers; but southward of that river, as far as the river Bidassoa, which divides France from Spain, the land is lower and more uniform, with sandy downs, and the coast is generally clear of danger. The departments bordering on the coast are Finisterre, Morbihan, Vendée, Charente, Gironde, and Landes.

The principal rivers are the Loire and Gironde; and amongst those of minor importance are the Valaine and Adour.

The only islands of any magnitude are those situated on the north-west part of the coast, the principal of which are Ushant, Belle Ile, Iles d'Yeu, de Ré, and d'Oleron.

The principal ports.—Brest, one of the chief naval arsenals of France, situated near the west extreme of the department of Finisterre, possesses an extensive roadstead or harbour covering an area of about 15 square miles, known as the Rade de Brest. Louis and L'Orient, the latter being one of the naval ports of France, has a large and commodious arsenal, but the port is occupied only by vessels of war. St. Nazaire and Nantes on the river Loire. Rochelle

and Rochfort in the department Charente. Bordeaux, on the river Gironde, the third port in France and capital of the department of Gironde, has the advantage of a direct communication with the Mediterranean by the canal du Midi. Bayonne, on the Adour, has a commodious dockyard, and the arsenal is one of the best and most complete in France.

LIGHTS.—On the coasts of France, lights of the catoptric character (or by reflectors), and which are described as being visible through a limited arc, may be seen when the light is approached within the distance of $\frac{1}{10}$ or $\frac{1}{100}$ of the given range of visibility, 55° to 60° on each side of the centre of such arc—that is, when not otherwise obscured. Thus—On the north coast of France, the light exhibited on Lanvaon heights, L'Aberwrac'h river entrance, and which is visible from a distance of 14 miles through an arc of 36° —or 18° on each side of the leading mark (Lanvaon and Vrac'h islet lights in line)—can be seen when within the distance of 5 miles from the light through an arc of about 115° —or about 57° on each side of the above-mentioned line of direction.

FOG SIGNALS.—It is not always possible to determine, at the fog signal stations on the coasts of France, the existence of fog banks in the offing; and that always, nearly an hour may elapse from the time it is considered necessary to use the fog signal until it is first made. Mariners are therefore cautioned, that when approaching the land in a fog, they should not rely implicitly upon these fog signals, but should always use the lead, which, in nearly all cases, will give sufficient warning to avert danger.

STORM SIGNALS.—These signals are made at the harbours and semaphore stations on the coasts of France, and remain hoisted for 48 hours from the time of receiving warning from the Minister of Marine.

The signals are made with a cone and drum, painted black, and when hoisted, appear as a triangle and square.

Southerly gale:—The cone point downwards means that strong winds are probable, at first from the southward (from S.E. round by S. to N.W.).



Northerly gale:—The cone point upwards means that strong winds are probable, at first from the northward (from N.W. round by N. to S.E.).



Very heavy gales:—The drum is hoisted with the cone whenever a very heavy gale, either southerly or northerly, as the case may be, is probable (with southerly gales above the cone, with northerly gales below the cone).



The drum is not used without the cone.

Sudden shifts of wind:—No signal is employed to indicate a wind which is likely to shift suddenly, but it must be remembered that a southerly wind is much more likely to veer to a point north of west than a northerly wind is to veer to a point south of east. Consequently, when the south cone is hoisted and a vessel is at an anchorage open to the N.W., it is well to be prepared for a gale from that quarter.

Meaning of signal:—The hoisting of any of these signals is intended as a sign that there is an atmospherical disturbance in existence, which will probably cause a gale from the quarter indicated by the signal used, in the neighbourhood (say, within a distance of 50 miles) of the place where the signal is hoisted, and the knowledge of which is likely to be of use to the sailors and fishermen on that part of the coast. Its meaning is simply, "Look out! It is probable that bad weather of such and such a character is approaching you."

WEATHER SIGNALS.—In addition to the established storm warnings, the following system of weather signals indicate the state of the weather in the offing at the principal ports and shipping places on the coasts of France.

These signals are hoisted at the semaphore stations and harbour offices for half an hour, morning and evening.

1. A flag of any colour indicates - Weather doubtful, barometer inclined to fall.
2. A short pendant (cornet) of any colour - - - - Appearance of bad weather, heavy sea, barometer falling.
3. A pendant of any colour - - - - Appearance of better weather, barometer rising.
4. A flag above cornet - - - - The entrance of the port has become dangerous, be careful.
5. A cornet above flag - - - - The lifeboat is coming out.

Note.—In settled fine weather no signals are made.

DANGER SIGNALS.—The following danger signals have been established on the coasts of France in the event of the entrance of a harbour being obstructed by a stranded vessel or by any other accident, viz :—

By day, a red flag is hoisted on one of the jetties.

At night, a red light is exhibited ; and in those harbours where a single light is already established, a second light is exhibited, and both show red lights.

TIDAL SIGNALS.—The following system of tidal signals was established in August 1855 by the French Minister of Commerce and Public Works, and is now, with some variations, used at all the ports on the coast of France. The signals are made by flags and black balls hoisted on a mast, on which a yard is crossed.

A ball hoisted at the intersection of the mast and yard denotes a least depth of 10 English feet throughout the channel of the harbour.

Each ball hoisted on the mast under the first denotes an additional depth of $3\frac{1}{2}$ feet.

Each ball hoisted above the first denotes an additional depth of $6\frac{1}{2}$ feet.

Each ball hoisted at the left yard arm, looking from seaward, denotes an additional 10 inches.

Each ball hoisted at the right yard arm denotes an additional 20 inches.

A white flag with a black cross, also a black pendant, are used to indicate the state of the tide. These are hoisted at the masthead immediately there are $6\frac{1}{2}$ feet in the channel, and lowered when the water has receded to the same level. During the flood the pendant is above the flag ; at high water and during the top of the tide the pendant is hauled down ; and during the ebb the pendant is under the flag.

When the state of the sea is such as to prevent vessels entering the port, these signals are replaced by a red flag hoisted at the mast-head.

It should be remarked that the signals are not necessarily complete at all ports ; but, so far as they are used, their signification is always the same. Thus, at some places the depths are shown only at every $3\frac{1}{4}$ feet, in which case balls at the yard-arms are not required. At others the depth of $6\frac{1}{2}$ feet, together with the state of the tides, is indicated by the flag and pendant, a ball being hoisted below them when there are 10 feet ; in this latter case the mast has no yard.

TABLE OF TIDAL SIGNALS.

9 ft. 10 in.	10 ft. 8 in.	11 ft. 6 in.	12 ft. 4 in.	13 ft. 2 in.	14 ft.	14 ft. 10 in.	15 ft. 8 in.
16 ft. 5 in.	17 ft. 3 in.	18 ft.	18 ft. 10 in.	19 ft. 8 in.	20 ft. 6 in.	21 ft. 4 in.	22 ft. 2 in.
23 ft.	23 ft. 10 in.	24 ft. 8 in.	25 ft. 6 in.				
RIISING TIDE.	HIGH WATER.	FALLING TIDE.					

PILOT SIGNALS.—The following pilot signals are established for the **French ports** :—

- (1). **Pilot vessels** must, when they have pilots on board, exhibit at the top a *white* light visible from all directions, lowered at intervals of at least 15 minutes.
- (2). **Vessels** requiring the assistance of a pilot should hoist a white flag with a blue border at the foretop, and when not supplied with such flag, their National flag.
- (3). **At night** vessels should show a *white* light above the bulwarks eclipsed for 15 seconds during each minute. This signal may also be accompanied by blue lights at intervals of 15 minutes.
- (4). **It is compulsory** for vessels in tow to take a pilot for each, and the charges are reckoned according to the tonnage or draught of the larger vessel. Every vessel in tow, as also the ship towing, has to pay half of the pilot tariff.

NOTE.—These regulations do not apply to the ports of Bayonne and Saint Jean de Luz.

BUOYS AND BEACONS.—A uniform system of colouring all buoys and beacons is observed on the French coast. In entering a port buoys and beacons painted red with a broad white band a little below

the top must be left to starboard, and those painted black to port. Those which may be passed on either side are painted with alternate red and black horizontal bands. This distinctive colouring of beacons applies only to the portions above the level of the highest tides ; below that level, all beacons, whatever their position, are painted white, as are also all warping buoys. The colours red and black are varied as circumstances require by chequers, vertical stripes, &c., in white. The small rocky heads in the frequented channels are painted in the same manner as the beacons, but only on such a portion of their surface as to render them sufficiently conspicuous.

Every buoy or beacon marking the sides of a channel bears in full length, or abbreviated characters, the name of the shoal or rock which it is meant to distinguish, and also its number, showing its numerical order in the channel. These numbers commence from seaward—the even numbers on the buoys and beacons painted red with a white band, and the odd numbers on the black buoys and beacons. Those painted with red and black bands have names only, but no numbers.

The letters and numbers, from ten to twelve inches in length, are painted white on the most conspicuous parts of the buoys and beacons. The masts of these beacons, which do not present sufficient surface, are surmounted by a small board. All the jetty heads and beacon turrets are painted above the half-tide level, and on the former a scale of metres is marked commencing from the same level.

The NORTH and NORTH-WEST COASTS of SPAIN, which extend from the river Bidassoa to the river Miño, embrace a distance of about 430 miles, and the provinces bordering on the coast are Guipúzcoa, Vizcaya or Biscay, Santander, Oviedo, Coruña, and Pontevedra ; the principal river being the Nervion, in Biscay.

The north coast of Spain is bold and rocky, with lofty mountains and ranges, generally terminating in steep cliffs and inclines, which are the leading features of this iron-bound coast.

Principal ports.—San Sebastian, the capital of the province Guipúzcoa ; Bilbao (situated on the river Nervion), the capital of Biscay, one of the most thriving ports in Spain ; Santander, capital of the province of that name, also a place of considerable commercial activity ; Gijon, in Oviedo, considered the second most important port in Spain, owing to the number of vessels which touch there ; Ferrol, with its magnificent harbour, naval arsenal, and docks ; Coruña, lying nearly mid-way between capes Ortegal and Finisterre, the centre of an extensive cattle trade ; and Vigo, a beautiful port with a flourishing trade, in Pontevedra.

Telegraphs.—The telegraph lines of Spain are in the hands of the State, and there is communication with nearly all parts.

The COAST of PORTUGAL from the river Minho to the river Guadiana is about 380 miles in extent, and embraces the provinces of Minho, Beira, Estremadura, Alemtejo, and Algarve. The principal rivers are the Douro and Tagus; and amongst those of minor importance are the Lima, Mondego, and Sado.

The principal ports are Oporto, Lisbon, Setubal, Lagos the chief town on the S.W. coast of Algarve, and Faro. Lisbon, the picturesque capital of Portugal, 547 miles from Madrid, lies in and upon an amphitheatre of hills, on the north bank of the Tagus, about 12 miles from the mouth of this noble river. Oporto, on the river Douro, is the second city in Portugal, and the first for trade.

Railways.—In 1886, about 1,000 miles of railway were open, besides 50 miles of tramways. Coming from Madrid the rail enters Portugal at Valencia de Alcoutara; further south it enters at Entrocamiento, by Badajos.

Telegraphs.—In 1884 there were 3,045 miles of telegraph open. The charge to the United Kingdom is 5½d. per word.

Meteorological signals.—The undermentioned Meteorological Signals have been established by the Portuguese government for passing vessels requesting the information, at the following Semaphore Stations, viz. :—Nossa Senhora da Luz, river Douro entrance; cape Carvoeiro, peninsula of Peniche; Oitavos, westward of Guia lighthouse, river Tagus entrance; cape Espichel; and Segrês point, near cape St. Vincent :—

The information will be relative to the state of the weather in the bay of Biscay, the strait of Gibraltar, and at Madeira :—

The state of the weather signalled is that prevailing at 7h. a.m.

As regards the strait of Gibraltar and Madeira, signals made before the hour of noon will relate to the state of the weather at 7h. a.m. on the previous day; after noon, to the weather at 7h. a.m. on the present day.

Similarly as regards the bay of Biscay, signals made before 2h. p.m., will indicate the weather at 7h. a.m. on the previous day; and after 2h. p.m., the weather at 7h. a.m. on the present day.

On exceptional days, when the meteorological bulletins from France have not been received at the Meteorological Observatory of the Infante D. Luiz until 3h. 40m. p.m., which is frequently the case in bad weather, the information signalled relative to the bay of

Biscay will be that of the day previous ; the same may occur with reference to the strait of Gibraltar and Madeira.

To avoid mistakes however, the date to which the state of the weather refers will always precede the information signalled.

Each notice will give :—first, the date to which it refers ; secondly, the locality to which it has reference ; and then, two statements, the first indicating the direction of the wind, and the second its force.

In addition to the above, the notice may also contain other information which the Observatory may consider it expedient to give.

The direction of the wind will be expressed in one or other of the eight principal points, viz. :—N., N.E., E., S.E., &c. ; or, when it cannot be well determined, by the word, variable.

The force of the wind will be expressed by the words—calm, weak, moderate, fresh, strong, violent.

The questions put by vessels will always be answered by the last notice from the Observatory, the date of this being given, and the locality to which it refers. These two statements will not be signalled, should it appear that they may be omitted, owing to the terms of the question.

Example :—

Question.—What is the weather in Biscay ?

Reply.—Date—Biscay—N.W.—fresh.

Should vessels request other information, they will be answered by the signal V.K.N.—“ I do not know.”

In order to make the subject clearer, the following Meteorological notice is given relating to the 12th day of a certain month, and to Madeira, with the translation of the notice into the Signals of the International Code.

Example :—

Notice. 12—Madeira—N.E.—Moderate.

Signal. H.D.R.—B.R.G.M.—C.M.—D.K.G.P.

NOTE.—The signals will usually be made by flags, of the International Code of Signals ; and only by semaphore (distant signals), when colours of flags would not be easily distinguished.

The SOUTH COAST of SPAIN from the river Guadiana to Gibraltar is about 130 miles in extent ; and the provinces bordering on the coast are Huelva and Cadiz.

The principal ports are Huelva, San Lucar de Barrameda, and Cadiz. Huelva, on the river Odiel, is a place of some importance, owing to the rich pyrites and copper mines of Tharsis, Tinto, and other English. French and Portuguese companies in its vicinity.

Cadiz, the capital of the province of the same name, is one of the most important seaports of Spain, and the access to it from the sea is almost impracticable, from the rocks, ledges, and sandbanks by which it is surrounded; and being everywhere defended by ramparts, bastions, and detached forts, is all but impregnable.

The **BAY of BISCAY**, which takes its name from the province of Biscay, on the north coast of Spain, extends from Ushant on the north-east to cape Ortegal on the south-west, and is about 300 miles in breadth and 240 miles deep.*

SOUNDINGS.—The central part of the bay is very deep; the 100 fathoms line of soundings passes 75 miles south-west of Ushant, and skirts the west coast of France at about 90 miles distance, curving to within 30 miles of the shore in the south-east angle of the bay. Beyond soundings of 100 fathoms the water deepens suddenly, and about midway between Ushant and cape Ortegal attains a depth of 2,600 fathoms, over a bottom of gray mud and shells. Along the coast of Spain, at 15 miles from the land, the depth is from 150 to 200 fathoms, rock and coral, but frequently no bottom is to be found at that depth, even near the land, whilst at 40 miles off no bottom is to be found with about 1,500 fathoms.

On the parallel of Ushant, $48^{\circ} 28' N.$, the 100 fathoms edge of soundings is much more distant: here it is found in about long. $9^{\circ} 25' W.$; but for 65 miles westward of this meridian are very irregular depths, several spots having less than 100 fathoms, with depths between them in some cases of over 1,000 fathoms. But this parallel bordering so closely on the 100 fathoms edge of soundings, the depths are very irregular until as far eastward as $7^{\circ} 30' W.$ The Little Sole bank, in long. $8^{\circ} 53' W.$, has from 63 to 67 fathoms, is 4 miles in extent N.E. and S.W., and its southern edge is only 5 miles from the 100 fathoms line, beyond which the depths increase rapidly. From the shoalest part of the Little Sole bank, 63 fathoms, Ushant N.W. lighthouse bears E. by S. $\frac{3}{4}$ S. 148 miles. As Ushant is approached from the meridian of $7^{\circ} 30' W.$, the progressive shoaling is more gradual, the 70 fathoms line being only reached in long. $6^{\circ} 8' W.$ † The north-eastern end of Parsons' bank is, however, crossed in $6^{\circ} 25' W.$, and here, within a distance of 6 or 8 miles, the depth decreases from 86 to 68 fathoms, and deepens again to

* See Admiralty chart:—British islands to Mediterranean sea, No. 1; scale, $1:2.1$ inches; also Bay of Biscay, No. 1,104; scale, $m = .07$ inches.

† See Admiralty chart, No. 1598, containing the soundings obtained by H.M.S. *Research* during the summer of 1869.

74 fathoms. The shoalest part of Parsons' bank, however, lies southward of this parallel, and from lat. $48^{\circ} 26' N.$, long. $6^{\circ} 30' W.$, it has a depth of only 56 or 59 fathoms for about 6 miles to the south-westward.

After passing eastward of this bank the depths are 72 to 70 fathoms, coarse pale yellow ground, resembling semi-indurated marl with a mealy surface, interspersed with broken pieces of shells and a substance like chaff. At 27 miles from Ushant the depths are from 66 to 63 fathoms, fine sand or sand and shells, and 66 fathoms has been found within 5 miles of the rocks.

In thick weather, as a general rule, do not come into less than 65 fathoms when approaching Ushant from the southward or south-westward until certain of being northward of its parallel, and keep the lead constantly going; but observe that, 53 or 54 miles from Ushant, less water may be found on the Kaiser-i-hind bank, which, from lat. $48^{\circ} 4' N.$, long. $6^{\circ} 19' W.$, extends for at least 11 miles N.E., with depths of from 66 to 63 fathoms; deeper water, however, lies between this bank and the 70 fathoms line of soundings.*

On the parallel of Ushant the whole extent of the edge of soundings may be traced in fine weather by the numerous rippings in its vicinity; and in boisterous weather the transition from deep water to comparatively shoal is rendered apparent by the sudden alterations in the colour of the water, which changes from a dark indigo blue to various shades of green.

On La Chapelle bank, which lies W. by S. 104 miles from Creac'h point lighthouse, there are from 80 to 83 fathoms, and deep water all around; and about 30 miles to the south-westward of the bank a shoal spot of 68 fathoms has been reported.

On the parallel of the Chaussée de Sein, commonly named the Saints, the transition from deep to comparatively shoal water is very sudden. In lat. $48^{\circ} 6' N.$ and long. $8^{\circ} 7' W.$ there are 326 fathoms water over dark bluish-gray mud, at only 10 miles westward of the 100-fathoms edge; and the whole of the south-western edge of the bank bordering the north-western coast of France appears to be equally steep. In the parallel of Rochelle a depth of 900 fathoms was obtained, 30 miles westward of the 100-fathom edge of the bank, and 2,275 fathoms at 60 miles.

Between the parallels of Penmarc'h point and Rochefort, or more

* See Channel Pilot, Part II.

precisely between the latitudes of $45^{\circ} 50'$ and $47^{\circ} 53'$, there is a remarkable bed of soft mud, limited to the south-east by the Plateau de Roche Bonne. It extends about 150 miles in a north-west and south-west direction, is 20 miles in breadth, and useful to verify a vessel's position. The surface of this mud is very soft, especially on its edges, where it is mixed with a little very fine gray sand, and will scarcely adhere to the lead. To the eastward the mud is more firm, and westward the bottom becomes more or less rocky. This difference between the qualities of the bottom leaves the bed of soft mud in a north-west and south-east direction.

Off the mouth of the Loire, between Belle Ile and Ile d'Yeu, the depths vary from 35 to 15 fathoms, and the bottom is composed of sand and gravel and of broken shells. In the offing, westward of the soft mud which has been described, the bottom is of sand, of a grayish colour, and frequently mixed with broken shells. This quality of the bottom continues westward to soundings of 180 fathoms, and extends in a north-west and south-east direction between the parallels of about $45^{\circ} 50'$ and $47^{\circ} 25'$.

In concluding these remarks, the mariner is reminded that, to judge correctly of a vessel's position, a continuous line of soundings should be taken over a considerable distance. Occasional casts are of comparatively little use.

WINDS AND WEATHER.*—The prevailing winds in the bay of Biscay throughout the year are those from N.W., West, and S.W. Severe gales are frequently experienced from the same quarters, often attended with violent squalls, rain, hail, and thick weather. These gales, blowing over the full extent of the North Atlantic, cause a mountainous sea in the bay, and at the mouth of the English channel.

A low barometer, heavy banks of clouds with lightning to the westward, threatening appearance of sunrise or sunset, and often an ominous westerly swell, are each and all indicative of the approach of one of these gales; and, as a rule, the longer these indications the greater will be the force and duration of the coming storm. Commencing very often at South or S.W. with rain and thick weather, the wind gradually veers round to West and N.W. with clearer weather; and perhaps, after lasting from this quarter for a day or two, backs again to the old quarter: a slight rise may then be perceptible in the barometer, indicating a greater force in the wind,

* See Admiralty Pilot charts for Atlantic ocean, 1875; and Wind and Current charts for Pacific, Atlantic, and Indian oceans, 1879.

which may continue for several days to blow in the same direction, shifting two or three points either way with occasional lulls, and finally with a decided rise in the barometer the gale blows itself out.

No fixed rule appears applicable to these gales; they more frequently however commence in the south-west quarter, and blow themselves out in the north-west.

On the north and north-west coasts of Spain, as well as on the west coast of Portugal, the westerly gales are felt in full force. In these parts, if a calm with a westerly swell succeeds a south-west wind, it is considered a forerunner of one of these gales; they become less frequent and violent as the latitude of Gibraltar is approached, and their influence may be said to cease about the latitude of the Canary islands (28° N.).

Easterly winds occur at intervals throughout the year, but are most common about the period of the equinoxes, when they often increase to gales of long continuance, generally attended with fine clear weather and high barometer. February and March are the months in which these winds may be said to be strongest and most frequent.

In the summer months, June, July, August, fine weather and light southerly and south-easterly winds are often to be met with in the bay of Biscay, and westerly gales are least frequent; but this time of the year is by no means exempt from the visitation of both easterly and westerly gales.

Fogs prevail in October and November, and on the coasts of the bay, as well as in the bay itself, are notably dense; they seldom last however, for a longer period than 24 hours before a change of wind causes them to disperse.

Rain is most common during the winter months, and at the season of the equinoxes.

For description of the local winds and weather on the coasts of Spain, Portugal, and the strait of Gibraltar, the mariner is referred to the index of this book.

Barometer.—In the northern hemisphere the effect of the veering of the wind on the barometer is according to the following law :—

With East, S.E., and South winds the barometer falls.

„ S.W. winds the barometer ceases to fall and begins to rise.

„ West, N.W., and North winds the barometer rises.

„ N.E. winds the barometer ceases to rise and begins to fall.

The connection between the height of the barometer and the direction of the wind according to a law discovered by Professor Buys Ballot, and bearing his name, is expressed in the following rule:—"Stand with your back to the wind, and the barometer will be lower on your left hand than on your right hand."

This rule applies to the northern hemisphere, but must be reversed in southern latitudes.

CURRENT.—The general easterly drift of the North Atlantic, striking the land about cape Ortegal in Spain, appears to divide into two branches; the northern portion flowing east along the north coast of Spain, while the other is deflected to the southward along the coast of Portugal.

In ordinary weather this drift is slight, and no dependence can be placed in its being felt by the mariner; in fact, instances are recorded of wrecks northward of cape Ortegal drifting to the westward. When, however, strong westerly winds are prevailing in the Atlantic Ocean to the westward of the north coast of Spain, a very considerable current sets into the southern part of the Bay of Biscay, which diverted by the coast of France may set to the northward past Ushant, and thence across the entrance of the British Channel towards cape Clear. It is, however, pretty well established that this latter, which has received the name of Rennell's current is only an occasional current so far as navigation is concerned; but, as it may attain a rate of one, or one and a half, knots an hour, the knowledge of its possible existence, should be borne in mind.

The usual set about Ushant is undoubtedly to the eastward, and this coupled with the great and well-known strength of the tides in the vicinity of that island should induce great caution in making it.

The evidence of divers employed on wrecks on the north-west coast of Spain shows that strong easterly currents set in on the land in fine weather without any local wind, but as it has been remarked that a westerly gale has nearly invariably followed, such currents are probably due to the gale while still far to the westward.

This fact goes to show that easterly currents may be expected in all weathers.

A similar phenomenon has been recorded in the strait of Bonifacio, and it is highly probable that it is universal.

The Portugal Current.—It may be taken for granted that the whole surface of that part of the Atlantic ocean between the parallels of 40° N. and 35° N., at least, and from a distance of 300 miles from the shore to 390 miles west of it, is in motion towards the strait of

Gibraltar and the African coast; this direction of current is experienced when 50 miles west of Madeira, westward of which position it sets to the south-westward.

From cape Finisterre the current generally flows to the south-east and south along the coast of Portugal as far as cape St. Vincent, but the current may occasionally set in the reverse direction. From cape St. Vincent it runs easterly towards the strait of Gibraltar.

CAUTION.—The mariner will thus perceive that caution is necessary in crossing the bay of Biscay, and that due allowance should be made both for the outset and indraft, but especially the latter, when standing to the southward during thick weather for a position westward of cape Finisterre.

The coast between capes Ortegal and Finisterre is dangerous to approach at night, especially in the winter season, or in thick and foggy weather, which is frequent here, for not only does a powerful current at times set towards the land from the north-west, but the streams of flood and ebb often draw vessels out of their computed position. In the dark gloomy weather of winter the land is often concealed, but the beaches at the foot of the hills may sometimes be seen, when the latter are obscured in mist and haze, and it should be remembered that the 100 fathoms line passes just 10 miles from cape Finisterre, and also from cape Ortegal. (*See* pages 292 and 302.)

Many wrecks have occurred in the neighbourhood of Cape Finisterre, the majority probably owing to the effects of easterly set, and scend of the sea when crossing the Bay of Biscay, their position depending upon dead reckoning. Unless absolutely certain of the position, a very wide berth should, therefore, be given to this dangerous coast at night, or in thick weather.

Caution is always requisite in approaching a shore after a long run over a sea where doubtful currents prevail, but in this case the necessity is intensified by the fact that many of the lights are weak, and are placed so high that they are frequently shrouded in mist hanging over the land, thus giving little or no warning.

There is a most valuable bank of sounding fronting the whole shore, on which the depths decrease so gradually as the shore is approached that the distance from it can be told with considerable accuracy by the lead. The depths on it, however, are such that unless soundings are taken continuously, and the depth reached at each cast at least 7·0 fathoms, little warning may be given, as the 50-fathom line is in some places very near the coast.

Also, between capes Roca and Espichel, caution must be exercised by guarding against the indraught of the Tagus on the flood.

Mariners are also cautioned, when approaching cape Finisterre, especially in vessels from ports of the United Kingdom, to lose no favourable opportunity of ascertaining the errors of the navigating compass—one of the unsuspected causes of vessels being found, in thick weather, in dangerous proximity to the land being doubtless due to the disregard of these necessary observations.

Similarly, when homeward bound, great caution is requisite on approaching Ushant.

The island is surrounded by dangers in all directions, rocks are numerous and far from land, fogs and thick weather are not uncommon, the tidal streams are very strong, and the extent of their influence to seaward is undetermined. The flood sets north-eastward, and the ebb south-eastward, at the rate of 3 or 4 knots during springs; the flood stream turning more eastward, and thus setting more directly towards the rocks as the tide slacks. Between Ushant and the Saints, the flood tide sets east, and the ebb westward.

In the offing the streams continue to run for three hours after time of high and low water.

The depths round Ushant are irregular, and give no certain information, but in thick weather, the lead, and lead alone, can give safety, and it should be kept going constantly. No vessel can feel sure unless she keeps in more than 65 fathoms water.

Though the lights on Ushant are of the highest brilliancy, and the fog signals of great power, no confidence can be felt in seeing or hearing them, and many a ship has been lured to destruction by trusting to them in weather apparently only a little thick.

VESSELS WITH STEAM POWER.

Page 14, line 2 from bottom :—

For "7·0 fathoms" read "70 fathoms, no bottom."

set strong along shore, and have a tendency towards the cape. The ship's position should be carefully ascertained by four point bearings. After passing cape St. Vincent, a direct course may be steered for the strait of Gibraltar. For the description and directions for the strait of Gibraltar, *see* pages 417–421 and 435–437.

Caution.—A vessel approaching cape Trafalgar in thick weather may assure her safety by the use of the lead and the chart, as the soundings extend some distance from the land. The shoals off the cape, and the Cabezos, westward of Tarifa, should be carefully avoided by using the lead. With clear weather and common care no accident should occur, as none of these dangers extend more than 4 miles from the land; but with thick weather caution is necessary, the currents, tides, and eddies between cape St. Vincent and Tarifa being very variable.

The lighthouse on cape Trafalgar exhibits a *revolving* white light whilst that on cape Spartel shows a *fixed* white light, and as they are 24 miles apart, N. $\frac{1}{4}$ E. and S. $\frac{1}{4}$ W., and either light in clear weather is seen at the distance of about 20 miles in all directions to seaward, the extreme range of these lights embraces more than 60 miles of latitude; and thus, on approaching the strait, unless in very thick weather, the mariner should necessarily observe one or other of the lights.

GIBRALTAR to ENGLAND.—The homeward passage from Gibraltar for steam vessels is the reverse of the outward passage, but on entering the English channel much caution is requisite in rounding Ushant, especially when the position has not been satisfactorily determined a short time before coming up to its parallel. (*See* Caution on pages 14 and 292.)

SAILING ROUTE.

ENGLAND to GIBRALTAR.—Sailing vessels bound to the southward from the English channel, and having a fair wind, should at once make westing, as the prevailing winds are from that quarter. It is usual, therefore, on leaving the Lizard, to shape a W.S.W. course, so as to be able the better to weather Ushant should the wind become adverse ; but, if it continue fair, it is absolutely necessary to correct the dead reckoning as frequently as possible by astronomical observations, in order to reach the parallel of the north coast of Spain sufficiently to the westward for the safety of the ship.

Thus far the run across the bay of Biscay has been considered under circumstances of fair winds and fine weather ; but if, on leaving England, an adverse wind and threatening appearance of weather, with low barometer, be encountered, the prudent mariner will do well to seek shelter in some safe anchorage, in order to save wear and tear, and be in an efficient state for prosecuting the voyage with the first favourable change. If, however, the vessel has advanced too far to sanction this retrograde movement, or it be determined to continue, the ship should be hauled to the wind on the tack which will best enable her to approach the proper course without drawing deep into the bay, which is especially to be avoided.

It would be better, therefore, to reach to the westward as far as 10° or 12° W. at some loss of ground, rather than risk being sent into the bay, as south-westerly gales frequently blow out by drawing round to the north-westward, which, if a tolerable board has been made in that direction, permits the ship to be tacked, and at once to proceed on her course a point or more free. It is during and after these gales that the indraft of the bay is most felt and to be guarded against, but with the above change of wind opportunities will most probably occur for taking observations, after which a safe course may be shaped.

Should the vessel have had to contend with southerly and south-easterly gales she will have been driven to the westward, and in this case the aim should be to make the best progress to the southward possible under the circumstances. On the other hand, if westerly gales have prevailed, and the vessel has become embayed, it may be found difficult to weather cape Finisterre, or even cape Ortegal ; under these trying circumstances refuge may be found in Ferrol, Coruña, Barquero, or Vivero, the two latter ports being about 10 and 15 miles respectively eastward of cape Ortegal. In extreme cases, with loss of masts and sails, the ports and roadsteads of France from the Gironde to Brest are under the lee, and the anchorage inside Belle-Ile and the Pertuis Breton, &c., are open and safe. (See p. 14.)

Proceeding to the southward from off cape Finisterre, a course should be shaped to clear the Farilhões and Burling island, the former of which lie about 205 miles to the southward of the cape, and 10 miles north-westward of the peninsula of Peniche, and should be avoided at night, or with south-westerly winds, which are frequently accompanied with thick weather, under which circumstances it is better to keep off the land, in order to escape the northerly current that sets along the coast with those winds, as well as to be in a position to profit by any change of wind to the west and north-west; in short, it is better to run to the southward at some distance from the coast of Portugal, as westerly winds make it a lee shore, and in winter these gales are frequent, blowing with great force, and continuing for several days together.

If the latter course be adopted, it will be prudent to sight cape St. Vincent, and then steer for cape Spartel, which is safe to approach being clear of danger, with 100 fathoms water, at the distance of 3 miles off shore. The land rises from the cape with a gradual slope to about 1,000 feet above the sea at a mile within, and consequently can be seen from a long distance. To the south of the cape the land falls, and has been mistaken at a distance for the mouth of the strait, which has led to the loss of several vessels; hence, in dark unsettled weather, should the light not be in sight, caution is necessary. After rounding cape St. Vincent, as the vessel proceeds to the south-eastward, the state of the wind and weather, and the indraft and current of the strait of Gibraltar, must be considered and allowed for.

GIBRALTAR to ENGLAND.—Sailing vessels bound from Gibraltar to England, after passing cape St. Vincent with the prevailing northerly winds, generally endeavour to get an offing of 100 or 150 miles, to avoid the south and south-easterly currents near the coast of Portugal, mentioned in page 14; should, however, a southerly wind be experienced, it will not be necessary to keep so far from the land. For directions on approaching the English channel, see "Channel Pilot," Parts I. and II.

Caution.—In approaching Ushant during thick weather it is absolutely necessary to keep the lead going. (*See* p. 15.)

Tides off Ushant.—*See* pp 13 and 15.

CHAPTER II.

USHANT TO ILE DE GROIX.

VARIATION IN 1891.

Ushant - 18° 45' W. | Ile de Groix - 17° 30' W.

USHANT, or ILE D'OUessant* lies 10 miles westward of the western extreme of the coast of France. It is about $4\frac{1}{4}$ miles long, W. by N. and E. by S., about 2 miles wide, and its highest part, towards the north-east, is 195 feet above the level of the sea. In fine weather the island is visible from a distance of 15 to 20 miles, the outline appearing rugged and uneven, and the shore composed of high, craggy, and precipitous rocky cliffs of granite formation. It is surrounded by dangers, and shipwrecks are frequent, but it has three bays in which small vessels find temporary shelter. There are two lighthouses on the island—one on the north-east extreme, the other at the north-west. There is a spacious church at Lampaul, and the only trees on the island are in the Vicarage garden.

The inhabitants are chiefly employed in rearing cattle and as fishermen. Many of the latter are well acquainted with, and can act as pilots for, the passages in the vicinity, rendered dangerous by the numerous hidden as well as apparent rocks and islets lying between the island and the main land. The people, generally, speak pure Breton.

The only village on the island is named Lampaul, or Portspaul, situated at the head of a bay on the south-west side, where there is a small tidal basin, almost wholly dry at half-tide. It is here that the pilots reside. In the other parts of the island the houses are scattered, forming only small hamlets. A post-boat communicates with Conquet

* See Admiralty charts :—France, west coast, the channels between Ile d'Ouessant and the mainland, No. 2,694 ; scale, $m = 1\cdot5$ inches ; France, north coast, sheet 8, Ile d'Ouessant to les Sept Iles, No. 2,644 ; scale, $m = 0\cdot5$ of an inch ; France, west coast, Ras de Sein to Ile d'Ouessant, sheet 7, No. 2,643 ; scale, $m = 0\cdot5$ of an inch ; British islands to the Mediterranean, No. 1 ; scale, $d = 2\cdot1$ inches ; and English channel, sheet 2, No. 2,675 b ; scale, $m = 0\cdot15$ inches.

Chapter II. of this volume, being in part identical with Chapter I. of Channel Pilot, Part II., the mariner should consider which book contains the latest information.

on the main land, at which place the produce of the island, consisting of soda, grain, sheep, and poultry is disposed of.*

Fog.—In misty and foggy weather the Archipelago of Ushant is especially dangerous; in the year 1875 five large vessels were wrecked from this cause, mariners are therefore cautioned that the constant use of the lead, and attention to the fog signals, are the only guides to ensure a vessel's safety.

The average number of days when fogs of more or less duration occurred for five years, 1871–1875, was 60 in each year.

Winds.—The following table shows the mean prevalence of winds at Creac'h point lighthouse in the five years 1871–1875 :—

SEASONS.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
	Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.
Winter ...	9·2	9·4	8·4	7·1	7·2	15·9	18·0	15·8
Spring ...	16·3	16·1	16·3	5·5	4·7	8·3	13·3	11·5
Summer ...	20·6	11·6	7·5	1·4	4·2	9·6	21·9	15·2
Autumn ...	14·5	8·7	9·6	7·0	6·8	10·6	18·3	15·5
Total ...	60·6	45·8	41·8	21·0	22·9	44·4	71·5	57·0

The climate of Ushant is similar to that of Brest, temperate and humid.

Supplies.—Wood is scarce, but water and other supplies can be obtained in moderate quantities; for fuel the natives find a substitute in a kind of turf. Local custom forbids the burning of seaweed, which is reserved entirely for agriculture.

LIGHTS.—**North-east Light.**—On Stiff point, the N.E. extreme of Ushant, is exhibited a *red and white flashing* light, with eclipses every *twenty seconds*, and showing a *red flash*, alternately with *two white flashes*. It is elevated 272 feet above the sea, and in clear weather the white flashes should be visible from a distance of 25 miles, and the red flashes 21 miles.

North-west Light.—On Creac'h point, the north-west extreme of the island, is a circular tower, with black and white horizontal bands, from which is exhibited, at an elevation of 223 feet above

* The French government maintains a physician at Ushant, who is also mayor of the island.

high water, an *electric group flashing white light*; the groups show *every 10 seconds*, each group consisting of *two flashes*, separated by an interval of $2\frac{1}{2}$ seconds, the interval between the groups being $7\frac{1}{2}$ seconds. The light should be visible in clear weather from a distance of 21 miles, but the intensity of the flashes will enable the glare to be seen considerably beyond that distance.

Fog trumpet.—During thick and foggy weather a fog trumpet is sounded on the west point of the island, about $\frac{1}{10}$ of a mile S.W. $\frac{1}{2}$ W. from Creac'h lighthouse, *every forty seconds*, giving *two* consecutive sounds (of the same tone) of *three seconds* duration, separated by an interval of *two seconds*. The sound may generally be heard 3 miles in calm weather.*

A Life boat is stationed at Lampaul.

Semaphores and Telegraphs.—By using the Commercial code of Signals, passing vessels can communicate with either the semaphore on Creac'h point or that on the N.E. point, and by this means telegraphic messages may be sent to all the countries of Europe, through the cable laid from Stiff bay to the bay of Laberildut.

BAIE DE LAMPAUL, on the south-west side of the island, is the principal anchorage, and may be considered the port of Ushant. This bay is only used by small vessels, and affords good shelter from winds northward of West round to S.E., but it is exposed to the whole force of south-west gales, when it is dangerous, and leaving the bay often impassable, even for steam-ships. The water is deep, but shoals gradually towards the head of the bay, thus rendering the anchors less liable to drag with south-westerly winds.

Jument rock, Basse Bridy, and Leurvas rock.—The dangers to be avoided in entering this bay are the Jument rock and a ledge named the Basse Bridy, lying to the south-west of the southern point of entrance, and the Leurvas rock S.W. by W. $\frac{3}{4}$ W., a long half mile from the northern point. The Jument lies W.S.W. nearly $1\frac{1}{4}$ miles from Runiou point (which has a beacon on it), and uncovers 19 feet at the lowest tides, and is known at all times by the

* The French Government has given notice, dated 21st May, 1887, that, at the fog signal stations on the French coast, it is not always possible to determine the existence of fog banks in the offing; and that nearly an hour may always elapse from the time it is considered necessary to use the fog signal until the signal is first made. Mariners are therefore cautioned that, when approaching the land in a fog, they should not rely implicitly on these fog signals, but should always use the lead, which, in nearly all cases, gives sufficient warning to avert danger. (*See Fog Signals*, p. 2.)

breakers; the Basse Bridy, which never uncovers, lies $1\frac{1}{2}$ miles W. $\frac{1}{4}$ N. from the same point.

Le Corce and Men-ar-Blanc rocks.—A rock named Le Corce, the summit of which never covers, lies in the middle of the bay. The light-house, on the north-east extreme of the island, kept a little open north of the Corce rock leads between the Basse Bridy and the Luervas. Small coasters pass southward of the Corce and anchor near the head of the bay, southward of Men-ar-Blanc rocks, which are marked by a black turret. The bay is rarely free from swell, but the holding ground is good, and there are two mooring chains supplied by the Navy.*

Anchorage.—The best anchorage in Baie de Lampaul is, on sandy bottom, in 12 to 7 fathoms water, northward of the Corce.

Chaussée de Keller, Basse and Rocher Callet.—Two miles N.N.E. $\frac{3}{4}$ E. from the west extreme of Ushant, and 3 miles N.W. by W. $\frac{1}{4}$ W. from the north-east lighthouse, lies a small patch of 11 fathoms, with 21 to 28 fathoms close round it, named Basse Callet, at the west extreme of Chaussée de Keller, the name given to a chain or causeway of rocks extending N.W. by W. $\frac{1}{4}$ W. $1\frac{1}{2}$ miles from the western part of Keller islet. From the centre of Basse Callet, the north-east light-house is in line with Keller islet, bearing S.E. by E. $\frac{1}{4}$ E., and the west end of Rocher Callet, bears S. by E. $\frac{1}{2}$ E.

The Baie de Béninou, between Keller islet and the north extreme of Ushant, affords shelter, in 7 to 12 fathoms water, sand and rocky bottom, during southerly winds, but the anchorage is quite exposed to the northward. All things considered, this anchorage should only be used as the last extremity, for the holding ground is bad, and access to it difficult and dangerous on account of the currents.

The Baie du Stiff, on the north-east side of Ushant, affords temporary anchorage for small vessels, but it is open to the eastward; and even with westerly winds there is always a heavy swell. The dangers to be avoided on entering, are the Men-Corn and Douellan rocks, and Légoune bank, lying off the southern point, and the Gorlè-bian rock in the middle of the bay. The Men-Corn and Gorlè-bian rocks uncover at half tide, and are both marked by stone towers, showing 6 feet above high water springs.

Arland bay, on the south-east side of the island, is comprised between Enès Nein point on the west and Youch islet on the east;

* A buoy is moored in the bay for the convenience of vessels getting under weigh.

it is exposed to the violence of southerly winds and sea, and there are several shoals at the entrance. In 1874 the construction of a new port and mole was commenced here.

Pilots.—Should a vessel require a pilot, it is important that signals be made to attract attention, as many vessels pass near the island, both to the north and south, making it their point of departure when outward bound from British ports to the southward.

With south-west winds and flood tide, it is seldom possible for a pilot to come off. The pilots reside at Lampaul.

Tides.—It is high water, full and change, around Ushant, at 3h. 46m.; springs rise $19\frac{1}{4}$ feet, neaps $13\frac{3}{4}$ feet. Off the north-western coast of the island the flood sets N.E.; the ebb S.W.

Haut Fond d'Ouessant.—About $3\frac{1}{4}$ miles W. by S. $\frac{3}{4}$ S. from the south-west point of Ushant is the northern end of a bank, about $1\frac{1}{4}$ miles long, north and south, and half a mile broad, on which are 25 to 33 fathoms water, over a bottom of broken shells. Around it on all sides are 40 to 50 fathoms, and between it and the shoals extending off Ushant 48 to 50 fathoms.

Tidal signals.—See Chapter I., page 4.

The PASSAGE du FROMVEUR, with a depth of water of from 25 to 35 fathoms, runs parallel with the south coast of Ushant, along which are many rocks and rocky patches, but none extend more than half a mile from the shore. The Fromveur is dangerous, and ought to be avoided by all ships in heavy weather, and by sailing vessels in very light winds; the channel should not be attempted at night.

Men Tensel rock.—The principal danger lies on the southern side of the channel, off the broken rocky isle of Loédoc, from which a rocky ledge extends nearly half a mile in a W.N.W. direction, having at its extremity a detached rock, named the Men Tensel, which uncovers 15 feet at the lowest tides. Most of the rocks on this ledge, however, are visible at half ebb, and there is generally broken water over them at other periods of the tide; but care must be taken to avoid a sunken rock, with only 2 fathoms water over it, lying about $1\frac{1}{2}$ cables north-west of the Men Tensel. Between this rock and the Basse Darland, coast of Ushant, is the narrowest part of the channel, which is somewhat less than a mile across.

Directions.—When bound through this channel from the north-eastward—which, in a sailing vessel, should only be used in cases of necessity, and then only with the tide—give the east end of Ushant a berth of about a mile; and when this end of the island is in

line with the north-east lighthouse, bearing N.W. by N., and the Loédoc islet just open of the west side of Bannec isle, about S. by W. $\frac{3}{4}$ W., steer W. by S. $\frac{1}{4}$ S. for $2\frac{1}{2}$ miles, or until Ushant north-east lighthouse bears N.N.E. $\frac{1}{2}$ E., and open westward of Pen-ar-land mill, on the south-east coast of the island; when, if bound to Brest, the lighthouse kept on the above bearing and a S.S.W. $\frac{1}{2}$ W. course be made good for 3 miles, will lead westward of the Pierres Vertes. The north-west lighthouse, on Creac'h point, seen just over the south-west point of the island bearing N. $\frac{1}{2}$ W. leads about three-quarters of a mile westward of the $4\frac{3}{4}$ -fathom patch of the Pierres Vertes, and Creac'h point lighthouse in line with Runiou beacon bearing N. by W. also clears the Pierres Vertes $4\frac{3}{4}$ -fathom patch, and the rocks and shoal patches lying to the eastward of this line of bearing, which are too numerous to define; the mariner is therefore referred to the chart.

When Ar Men Guen Gondichoc is seen between the barracks and signal-staff of Molène, steer S. by E. $\frac{1}{2}$ E., which if made good will carry a vessel nearly $1\frac{1}{2}$ miles westward of the outermost danger of the Chaussée des Pierres Noires, which should be rounded with discretion, and the tide considered.

Tides.—The tidal streams run in the direction of the channel, about E. by N. $\frac{1}{2}$ N. and W. by S. $\frac{1}{2}$ S., but they are so rapid as to alarm persons unused to its navigation, particularly at springs, when the whole surface of the water has the appearance of breakers.

Pierres Vertes rises from a bank about $3\frac{1}{4}$ miles W. by N. from the signal staff on Molène island. The bank exceeds three-quarters of a mile in length in an east and west direction, with several rocky patches on it. The Pierres Vertes in the centre of the bank uncovers 7 feet at low water, and the Gondichoc one-third of a mile east of it also uncovers 7 feet. From the $4\frac{3}{4}$ -fathoms patch on the west end of the bank, the Men Du is in line with the Castel ar Mouliguët rock at the north end of Bannec, bearing N.E. $\frac{1}{4}$ E., and Ar Men Guen Gondichoc is seen between the barracks and signal-staff on Molène island bearing E. $\frac{3}{4}$ S.

Béniguët is a low island, $1\frac{1}{4}$ miles in length, and about a quarter of a mile in breadth. It lies in an E.N.E. and W.S.W. direction, and its eastern end is about 2 miles from Kermorvan point. A large number of rocks and sunken ledges lie on its south-eastern side, most of which begin to uncover at one-third ebb, and show a great extent of surface at low water. A long ledge of rocks extends from its south-western point to a considerable distance, every part of which is visible at low springs; but as the sea breaks on them with the least swell, they may be easily avoided. At the extremity of this

ledge are the Louedégues, two small rocks a few feet above the surface at all tides.

Fornic rock, which lies a quarter of a mile to the westward of the Louedégues, is marked by a tower.

The northern and western sides of the island are surrounded with rocks and low tide ledges which extend about 2 cables off; and a broken ledge of rocks extends from the north extreme, the whole of which are uncovered at low tide, and with the great Belveignou ledges form two small channels into the Four.

Almost the whole of this island is surrounded by a beach formed of small pebbles well calculated for ballast, which may be obtained without risk and little trouble. Off the beach on the northern side there is anchoring ground for small vessels close to it.

Le Cromic is a remarkable small rock, about 30 feet above high water, and at the distance of a few miles in hazy weather has much the appearance of a small vessel under sail. There are many half tide and low water ledges lying off it to the southward; the outermost rock, Basse Allaire, over half a mile off, begins to uncover at about half tide. The marks for this rock are Fornic rock in line with Kérouroc, and Lochrist church spire a little within the north point of Béniguet. Basse Allaire uncovers 17 feet at low water, and forms one of the dangers on the north side of the New channel into the Four.

Morgol isle has the appearance of a pebble beach, surrounded by black ledges in all directions, and separated from Le Cromic and Lytiry by small boat channels. The ledges from its southern side extend to the south-west and nearly join the southern ledge from Le Cromic; and from its eastern side they extend off about a quarter of a mile, forming the western boundary of the New channel into the Four, whilst the Belveignou ledges form the eastern boundary.

Vieille Noire (Groac'h-du) is a rocky shoal about $1\frac{1}{2}$ cables in extent, and uncovers 13 feet at low water springs. It lies with the town of Conquet seen over the north end of Béniguet island bearing E.S.E. nearly, and the eastern Bossemen a little open of the ledge of rocks or outermost breaker extending from Béniguet, bearing S.E. $\frac{1}{2}$ S.

About 6 cables W. by S. of the Vieille Noire is a small rock, which uncovers 10 feet at low-water springs, with $3\frac{1}{4}$ and $3\frac{3}{4}$ fathoms round it. The marks for it are, St. Mathieu lighthouse nearly in line with the Louedégues rocks, at south-west end of Béniguet island, bearing S.E. by E. $\frac{1}{4}$ E., and Molène signal-staff, a little within the west end of Triélen island, bearing N. $\frac{1}{4}$ W.

There are several shoal spots lying 6 cables to the south-east of this rock, and the same distance south-west of Vieille Noire. These shoals have from one-half to $2\frac{1}{4}$ fathoms over them, and occupy dangerous positions on the north side of the New channel into the Four.

Cleu Basseven is a bank about half a mile in length east and west, and a quarter of a mile in breadth. A small portion of the middle of the bank uncovers 3 feet at low-water springs, but elsewhere there are from one to $5\frac{1}{4}$ fathoms water. The eastern Serroux just open westward of the west end of Triélen island leads eastward of the bank.

The **Belveignou** are a large group of black looking ledges, of considerable extent at low water, with two small spots only appearing above the surface at high-water neaps; the remainder uncover gradually with the ebb, and at low-water mark the eastern boundary of the New channel into the Four. There are also two smaller channels on the southern and eastern side of these ledges, between them and Béniguet island.

Lytiry is a small broken islet lying northward of Morgol and Le Cromic, and only separated from them by a boat channel, through which the tides run rapidly. It has two or three small beaches of fine sand, and is surrounded by ledges which show at half tide.

Quéménès, like Béniguet, is a low island lying in an E.S.E. and W.N.W. direction, surrounded at low water with numerous ledges, particularly to the northward, making it unapproachable, but at high water, except on its eastern side. The small islet Lédénès de Quéménès on the north joins it by a beach at half tides.

Triélen is another low island lying nearly east and west, but smaller than Béniguet or Quéménès. It has a salt water pond at its east end surrounded by a stone beach. Its southern side, like the other islands, is not approachable at low water within 2 or 3 cables, having rocky ledges at that distance extending from it. At a long half mile S.W. $\frac{3}{4}$ S. of the west end of the island is a large bed of rocks called Les Serroux, visible at all times of tide, except very high springs, and of considerable extent at low water.

To the northward of the east end of Triélen, at a distance of $2\frac{1}{2}$ cables, is a small beach-looking islet, with black ledges extending from it at low water in almost every direction.

Molène island lies $1\frac{1}{2}$ miles north of Triélen with which it is connected at low water, by a plateau of rocky ledges. Molène

is 6 cables long north and south, and about 4 cables wide. There is a small pier on the east side of the island, the Barracks and signal staff (which is in telegraphic communication with Corsen point) being near the centre. There is a mill at the north end of the island and a church not far from the pier. A small island lies close to the eastward of Moléne, which has a beacon on its south-west end. Les Trois Pierres which lie half a mile to the northward of this island are marked, on the southern rock, by a square tower 10 feet high. There is a pilot and rescue station at Moléne.

CAUTION.—When standing towards the islands, just described, from the westward, mariners are cautioned not to approach them nearer than to bring Creac'h point lighthouse in line with Runiou beacon bearing N. by W., so as to avoid Pierres Vertes and Pierres Noires and the numerous dangerous rocks and shoals lying to the eastward of that line of bearing.

CHAUSÉE des PIERRES NOIRES is a rocky bank extending E.S.E. and W.N.W. over a distance of about 6 miles, the east end terminating $1\frac{1}{2}$ miles from St. Mathieu lighthouse. Several of these rocks rise 15 or 20 feet above the level of high water, whilst others uncover at all times of tide, and show considerably at low-water springs. The soundings on the bank are very irregular, varying from less than one to 10 and 16 fathoms. We shall begin the description of the rocks on this bank with the Basse Occidental des Pierres Noires, at the west end of the bank.

Basse Occidental des Pierres Noires, the most western shoal, has only $2\frac{1}{4}$ fathoms water over it, and lies with the eastern Serroux seen just open to the westward of the west end of Triélen island bearing N.N.E. $\frac{3}{4}$ E. and Les Cheminées between the large group of the Pierres Noires or Black rocks and Le Diamant S.E. by E. $\frac{1}{4}$ E. To the westward of the bank the water deepens to 27 fathoms at the distance of a mile.

Les Pierres Noires or Black rocks, are the western of the chain which uncover; they are about 15 feet above the level of high water, with a few ledges extending about a cable from them; on the largest of the rocks is a lighthouse. The south-western of this outer group is named Le Diamant, which is bold all round, with deep water between it and the other rocks; but at about a cable S.W. $\frac{1}{2}$ W. of it is the Roux, a patch which uncovers 2 feet at low water springs.

Le Boufoulloc, on which the *Magnificent* was lost in the year 1803, is a large uneven rocky bank, on which there are two small heads. The southern head lies N.W., distant $8\frac{1}{2}$ cables from Le Diamant, with St. Mathieu lighthouse a little open of the extreme north

end of Kérourroc islet, bearing E. by S. southerly. The northern head lies N.W. $\frac{1}{2}$ N. one mile from Le Diamant, with Lochrist church spire just clear north of the Plaeen ar Béniguet. Between Le Boufoulloc and the Plaeen ar Béniguet, eastward of it, is a bank about half a mile in length east and west, with $1\frac{1}{2}$ to $3\frac{1}{2}$ fathoms over it at low water.

Plaeen ar Béniguet is a large ledge of rocks lying a long half mile N.N.E. from Les Pierres Noires. These rocks uncover about 18 feet at springs, and being at all times seen by the breakers are a good mark to avoid other dangers. About 300 yards to the eastward and north-eastward of the Plaeen ar Béniguet are two rocks, which uncover at low water.

Le Petit Taureau is a small rocky shoal which uncovers 6 feet at low-water springs. It lies with Conquet church open of the south-west end of Béniguet island bearing E. $\frac{1}{4}$ S., and the Plaeen ar Béniguet bearing S.W. $\frac{1}{4}$ W., distant nearly three-quarters of a mile.

La Siège is a group of rocks, some of which are about 15 or 20 feet above the level of high water, and surrounded by ledges that uncover at low-water springs. These rocks on the west side, and the Pierre des Poissons, Kérourroc, Les Cheminées, and Ranvel on the east, form a passage for vessels having occasion to pass through the New channel into the Four, which is not, however, without sunken rocks, for the positions of which the navigator is referred to the chart. There is also a channel north-west of La Siège and Les Pierres Noires, or between these groups and the Plaeen ar Béniguet, where also there are sunken rocks and shallow patches to be avoided, and the chart must be the guide.

Kérourroc is a small islet, where a boat may find landing in almost any weather. There are many half-tide rocks and shoals round it, and about $1\frac{1}{2}$ cables north of it the Pierre des Poissons rises 27 feet above low-water springs. Between the Pierre des Poissons and Béniguet island are several shoal spots and rocks, some of which uncover at low water.

Cheminées are three small rocks about 30 feet above high-water; the two westernmost being nearly joined together. There are a few half-tide rocks, on the eastern side on which the sea breaks; the western Cheminée is bold, and lies on the south-east side of one of the passages to the New channel into the Four.

Le Ranvel is a ledge of rocks 5 or 6 feet above high-water springs. To the westward and the south-west are two patches which uncover 4 and 9 feet respectively at low water. These rocks are the

outermost or most southerly of this extensive chain, from the Pierres Noires to the eastern Bossemen.

Western Bossemen is a circular rock about 20 feet above the level of high water, having many detached ledges about it, which show at quarter and half tide in various directions to a distance of about 4 cables; and there are also on the north side between the ledges and Béniguët several rocks and shoal spots.

Eastern Bossemen is the easternmost of the *Chaussée des Pierres Noires*. It is small, circular, and about 15 feet above the level of high water. The *Men Civien*, a rock which uncovers 13 feet at low-water springs, is $1\frac{1}{2}$ cables N.E. $\frac{3}{4}$ E. of it. The *Basse des Bossemen* is a small sunken rock with about 10 feet water over it, and lies with the Western Bossemen nearly in line with the south-east point of Béniguët island, bearing about N. by W. $\frac{3}{4}$ W., and the Eastern Bossemen N.E. by E. $\frac{1}{2}$ E. distant about a third of a mile and open a little to the right of the town of Conquet.

Basse Large is a bank of about three-quarters of a mile in length N.E. and S.W., and half a mile in breadth. On its north part there are only 2 feet at low water, and on its south-east side one spot dries; on other parts of the bank there are from 2 to 4 fathoms water. Vessels standing towards the bank should keep *Le Diamant* open southward of *Le Ranvel*. *Le Diamant* in line with *Le Ranvel* leads on to the *Basse Royale* (*see* page 34). The south-east shoal spot lies with *Le Diamant* in line with *Les Cheminées*, and *Lochrist* church bearing E. by N. $\frac{1}{4}$ N., and well open of the Eastern Bossemen.

The coast from Melgorne point,* the north-west extreme of France, trends in a S.S.W. direction 11 miles to St. Mathieu point, at the entrance of the bay of Brest. It is moderately high, and the breaks and fissures in its granite formation, and the numerous and remarkably shaped rocks and islets near the land render its features easy of recognition. The shore generally is steep-to, but so bordered by the numerous dangers that it should not be approached by night, or in thick weather, within a depth of 45 fathoms, where the bottom will be generally of gray sand mixed with flints and other stones.

The whole space between the coast and Ushant is studded with islets, rocks, and shoals, and although pilots and persons well acquainted with the locality could conduct small vessels, and, more easily, steam vessels among them, yet for the general purposes of

* This point is surrounded by rocks and shoals too numerous to define; the rocky ledge, which dries, being marked by a cross.

navigation, the passages of the Four and Fromveur are principally used.

Two miles southward of Corsen point, which is easily distinguished by its steep cliffs and semaphore, the shore curves round westward, forming Blancs Sablons bay, in which there is anchorage in 4 to $7\frac{1}{2}$ fathoms water, sandy bottom, clear of dangers, but open to north and west winds. The head of this is separated from a small haven, named Le Conquet, by a narrow neck of land, the south-west extreme of which is Kermorvan point. Le Conquet dries at low water, and rocky ledges extend from both sides of entrance. On La Louve, north side of entrance to Le Conquet, there is a black beacon.

Kermorvan point is foul, and a short distance off it are two rocks, named Le Normand and Petite Vinotière, which appear only at low water.

Two-thirds of a mile S.S.W. $\frac{1}{4}$ W. of Kermorvan point is a shoal with 8 feet over it at low water, named the Renards, marked on its western side by a black buoy anchored in $19\frac{1}{2}$ feet at low water; 2 cables east of this shoal stands a black tower on Les Renards rocks. St. Mathieu point is distinguished by its lighthouse, semaphore and the ruins of an old abbey, and by the rocks called the Vieux Moines lying nearly half a mile south-west of the point, and which are about 4 feet above high-water ordinary springs. The point is bordered by rocky ledges, and about half a mile eastward of the lighthouse Les Respecta, which are above water, extend nearly half a mile from the shore. To the eastward of this ledge the shore is steep and may be coasted at the distance of half a mile.

Anchorage.—Blancs Sablons bay affords anchorage in 4 to $7\frac{1}{2}$ fathoms water, sandy bottom, clear of dangers, but open to north and west winds.

LIGHTS.—On Le Four rock stands a lighthouse, 85 feet high, from base to vane, from which is exhibited at an elevation of 92 feet above high water, a *fixed* and *group flashing* light, showing a *fixed white* light during *thirty seconds*, followed during the next *thirty seconds* by a group of *eight* distinct flashes, with an eclipse between each flash; thus the light will be alternately *fixed* and *flashing*; and should be visible in clear weather from a distance of 15 miles.

Fog Trumpet.—During thick and foggy weather a steam trumpet sounds a blast of *five seconds* duration, followed by an interval of silence of *twenty seconds*. (See fog signals, page 2.)

Corsen point.—From a small structure attached to the south wall of the semaphore building on Corsen point, is exhibited a *fixed*

white light, visible through a sector of about 4° , indicating the channel between Grande Vinotière to the westward, and Fulimant shoal to the eastward; it is elevated 105 feet above high water (5 feet above the ground), and should be seen in clear weather from a distance of 14 miles.*

CAUTION.—Mariners navigating the southern part of Chenal du Four should keep this light in sight, remembering that the eastern limit of the sector leads about 160 yards westward of Fulimant shoal, and that in the sector, on the western side, there is a shoal of $2\frac{1}{4}$ fathoms water lying S.S.E., 380 yards from the beacon on Grande Vinotière, and in the centre of the sector there is a shoal of $3\frac{1}{4}$ fathoms, lying E. by N. $\frac{1}{4}$ N., one-third of a mile from the beacon on Grande Vinotière. The channel marked by the sector is thus reduced, and limits the draught of water of vessels that can use the channel at night. It should also be remembered that Bassu du Chenal (page 34) is in the centre of the illuminated sector. (See page 33 for description of shoals round Grande Vinotière.)

Kermorvan point.—On Kermorvan point, at the north side of entrance to Le Conquet, is a square tower from which is exhibited at an elevation of 72 feet above the level of high water a *flashing white* light, showing *flashes* at intervals of *five seconds*, visible in clear weather at a distance of 13 miles.

Fog bell.—During thick and foggy weather a bell is sounded 14 times, an interval of *six seconds*, then *two* strokes, and again an interval of *six seconds*, &c. (See fog signals page 2.)

St. Mathieu.—On St. Mathieu point is a round tower, from which is exhibited, at an elevation of 177 feet above high water, a *revolving white* light, which attains its greatest brilliancy every *half minute*. The light is visible from a distance of 20 miles; the eclipses do not appear total within 8 miles.

Les Pierres Noires.—On the largest of Les Pierres Noires or Black rocks is a stone tower, from which is exhibited, at an elevation of 90 feet above high water, a *revolving red* light, which attains its greatest brilliancy every *ten seconds*, visible in clear weather from a distance of 12 miles. The off-lying rocks extend 3 cables S.W. of the lighthouse.

Life boat.—A life boat is stationed at port Conquet.

* It is intended to discontinue this light, and to exhibit a *white* light and a *red* light from a lighthouse northward of this position; also a *green* light, 328 yards southward of these intended lights.

Tides.—It is high water, full and change, in Conquet Roads at 3 h. 44 m. ; springs rise $19\frac{1}{2}$ feet ; neaps $14\frac{1}{2}$ feet.

CHENAL du FOUR.—This channel is between the great cluster of islets and rocks southward and eastward of Ushant and the main. The dangers along the coast are too numerous for a detailed description, but the following are the principal in the neighbourhood of the channels, for the others the mariner is referred to the chart.*

On approaching the coast from the northward the Four rock is a remarkable object ; it is a large dark conical mass, broad at the top, and rises 17 feet above high-water mark, a long mile N.W. $\frac{1}{4}$ W. of Melgorne point, and E. $\frac{1}{4}$ S. $10\frac{1}{2}$ miles from Ushant north-east light-house. It may be known by its vicinity to another large rock, named the Grand Château, lying between it and the Ile d'Iock.

Dangers.—On the eastern side of the channel, about one mile westward of the Four rock, is the Basse Boureau, a small patch with $5\frac{1}{2}$ fathoms water over it. Two miles to the south-west of the Basse Boureau is the Basse Muer, a patch of $4\frac{1}{4}$ fathoms ; in shore of this is the Basse St. Jacques, with nearly 4 fathoms over it, and a number of dangerous reefs, some of which just dry at low water. Two miles S.W. $\frac{1}{4}$ W. from the Muer is the Basse St. Louis, with $2\frac{1}{4}$ fathoms over it ; and $3\frac{1}{4}$ miles S. $\frac{1}{4}$ W. from the Muer is the Valbelle, with only 11 feet water, of small size and marked by a black buoy with staff and globe : it lies with Plouarzel church, seen between the Fourches islets, bearing S.E. by E. $\frac{3}{4}$ E. The channel between Valbelle shoal and the Platresses bank is only half a mile wide.

Currents.—The currents which attain 3 to 4 knots in neap tides and 6 to 7 in spring tides, in the narrowest parts of the channel follow nearly everywhere its direction, a circumstance which much decreases the dangers of navigation.

Depth of water.—The least water in Chenal du Four is abreast of Kemorvan point, where at low-water springs there are $2\frac{1}{4}$ and 3 fathoms.

Les Platresses are a cluster of rocks three-quarters of a mile long, in a north and south direction, some of which uncover at half ebb. They lie about midway between the Plateau des Fourches and the Plateau de la Helle, the northern part of these rocks lies $1\frac{1}{2}$ miles S. by E. $\frac{3}{4}$ E. from the Basse St. Louis. The north and south-east rocks are marked by red buoys on their east sides.

* Le Lieu rock, at the entrance to Laber harbour, is marked by a black stone tower, surmounted by a spherical vane, 15 feet above high water.

Plateau des Fourches consists of a number of rocks and shoal spots, many of which uncover at low water, extending about one mile from the shore towards the shoal La Valbelle, the channel between being only suitable for small vessels. **Basse des Fourches**, in the northern part of the plateau, is marked by a black stone tower, surmounted by a spherical vane, 12 feet above high water. Mariners should avoid passing this tower nearer than one-third of a mile, as it is situated in the middle of a plateau having several places awash at low water.

A rock, awash at low water spring tides, on the north-west edge of the Plateau des Fourches, lies N. 10° W., about 7 cables from the central Grande Fourche, and nearly a quarter of a mile north-west from the tower on Basse des Fourches.

The Tendoc rock, with only 9 feet over it, marked on its western side by a black buoy, lies nearly one mile S.E. by E. of the south-east rock of the Platresses, with the ruined mill of Trézien in line with the centre of a remarkable rock in shore, named Goaltock, bearing about E. by S. $\frac{1}{4}$ S.

The Basse St. Paul, with $2\frac{1}{2}$ fathoms over it, lies one mile westward of Corsen point, which will be recognized by its steep cliffs and semaphore. A black spire buoy is moored about 40 yards westward of the shoal.

Basse St. Pierre, on the west side of the channel, with 3 fathoms over it, lies S.S.W., nearly $1\frac{1}{4}$ miles from Basse St. Paul, and is marked by a red spire buoy.

The Grand Vinotière lies three-quarters of a mile N.W. $\frac{3}{4}$ W. from Kermorvan point and in the middle of the Four channel; it dries 9 feet at the lowest tides, and is marked by a black and red turret beacon. A rocky pinnacle, of $2\frac{1}{4}$ fathoms, lies S.S.E., 380 yards from the beacon, in the western side of the sector of light shown from Corsen point, and there is a shoal spot of $3\frac{3}{4}$ fathoms lying E. by N. $\frac{3}{4}$ N., one-third of a mile from the beacon in the centre of the sector of the light. There is also a shoal of $3\frac{1}{4}$ fathoms lying E. $\frac{1}{2}$ N., nearly half a mile from the beacon, just outside the sector of light, and a short distance to the southward of this shoal is another spot having the same depth of water over it.

On the western side of Grande Vinotière there are two shoals, one with 3 fathoms over it, lying N.W. $\frac{1}{2}$ W., half a mile from the beacon, and the other, of $2\frac{1}{2}$ fathoms, lying W. $\frac{1}{2}$ N., at the same distance from the beacon.

Fulimant shoal.—A rock with 12 feet of water over it, lies on the western edge of a small plateau, one-third of a mile N.W. $\frac{1}{2}$ W. from Kermorvan lighthouse, and nearly a quarter of a mile south-east of the Grande Vinotière. The shoal is marked on its northern edge by a small spiral buoy.

Nearly a quarter of a mile S.W. of this shoal is a small spot of 3 fathoms lying on the eastern limit of the sector of light shown from Corsen point.

Loquejon shoal.—A small black spire buoy is moored about 70 yards westward of this shoal, which lies off pointe de Penzers, and northward of pointe de St. Mathieu.

The Basse du Chenal, with 5 to 8 feet over it and steep close-to, is the south-west danger of the Chenal du Four, and is marked on its eastern side by a red and white buoy. From the buoy St. Mathieu point bears E. $\frac{3}{4}$ N. $1\frac{1}{2}$ miles, and Kermorvan point in line with Portzmoguer beach N.E. by N.

Basse Royale, with 24 feet water over it at low water springs, and 10 to 16 fathoms close around, lies S.W. $\frac{1}{2}$ W. $1\frac{1}{2}$ miles from Basse du Chenal.

Directions.—When bound through the Chenal du Four from the northward, bring the lighthouse on Kermorvan point in line with the lighthouse on St. Mathieu point, bearing S. $\frac{1}{4}$ E. By steering this course a wide berth will be given to the Boureau bank, and a vessel will pass to the westward of the Basse Muer, the Valbelle, and Tendoc, and to the eastward of the Basse St. Louis and the Platresses; but on nearing the latter shoal, great attention must be paid to keep the mark on, as the channel between them and the Valbelle is but half a mile wide.

Continue to the southward with the above mark on until about one mile from Kermorvan point, when, by steering S.S.W., the vessel will pass westward of the Renards and Vieux Moines, and to the eastward of the Grand Vinotière and the Banc du Chenal, and may gradually steer in for the Goulet or entrance to Brest.

The least water in the channel is abreast Kermorvan point, where at low springs there are $2\frac{1}{2}$ and 3 fathoms. A vessel in taking this or any of the other neighbouring channels should be well under command on account of the strong tide, which, at springs, runs $4\frac{1}{2}$ knots; the flood sets northward, and the ebb southward.

A vessel of heavy draught should pass 2 cables westward of the Grand Vinotière, and steer about S.S.W. $\frac{1}{2}$ W. for the eastern Bossemen until the town of Conquet bears East.

CHENAL de la HELLE is between Platresses bank and the Plateau de la Helle, which latter is an extensive bank, $2\frac{1}{2}$ miles long north and south, and dangerous throughout, as many of the rocky heads dry at low tide. A rock, named La Helle, lies on the north-western part of the bank, and is always uncovered.* It has the appearance of a vessel under sail, and bears S.E. $6\frac{1}{2}$ miles from Ushant north-east lighthouse. The tower on Les Trios Pierres in line with Molène church, leads westward of the Plateau de la Helle. The Channel is $1\frac{1}{2}$ miles wide, its direction is about N.N.W. $\frac{1}{2}$ W. and S.S.E. $\frac{1}{2}$ E., and it unites with the Chenal du Four, about 2 miles northward of Kermorvan point.

The Chenal de la Helle, practicable for the largest ships, is broad and favourable for beating, but the direction of the currents is less favourable than in the Four channel.

The **NEW CHANNEL** into the **CHENAL du FOUR**, between the island of Béniguet on the east and those of Quéménès, Morgol, and Lytiry on the west, may be used by small vessels; but as the tides in this passage run with great rapidity, every precaution must be taken to insure the vessel answering her helm quickly.†

To navigate this channel steer for the middle of Triélen island, on a N.N.E. $\frac{1}{2}$ E. bearing—keeping the eastern Serroux, which is always visible, well open to the left of the west point of Triélen, to clear the western 2-fathom patch of the Chaussée de Pierres Noires—and it will lead westward of the Boufoulloc rock, on which there are only 2 feet water at low springs. When the lighthouse on St. Mathieu point is opened a little to the northward of the Placén ar Béniguet—which is always to be seen either as rocks or breakers—steer for Morgol isle until Lochrist church is just over the south end of Béniguet. Thence steer about East, taking care, on nearing the narrow part of the channel between Béniguet island and the ledge southward of Morgol isle, and that of Belveignou, not to shut in the two eastern Cheminées with Kérouroc isle, until the spire of Lochrist church is seen over the centre of Béniguet island.

* Le Faix rock, lying eastward of La Helle, is marked by a red stone beacon, surmounted by a ball.

† In the French chart by M. Beautemps Beupré, 1818, the soundings are sparsely marked between Morgol isle and the Belveignou ledge, and at rather more than half a mile south-east of Morgol isle, as little as 6 feet water are shown on the chart. But in 1806, Capt. Hurd, R.N., says, "In every part of the channel to within half a mile of the Béniguet island, there are from 10 to 6 fathoms water, and in the shoalest part, between Morgol isle and Belveignou, I have nowhere found less than $3\frac{1}{2}$ fathoms at the lowest springs; and therefore on all neap tides you may fairly calculate on 4 fathoms at low water."

From this point the channel becomes open to the N.N.E. $\frac{1}{2}$ E., between Morgol isle and the Belveignou ledges, and may be steered for, carefully avoiding to open the inner or easternmost Louédéguet rock with the west end of Kérouroc isle, until Le Cromic appears over the centre of Morgol isle, when the west extremity of Belveignou ledge will have been passed, and the channel will begin to deepen and widen. Having passed the Belveignou, steer to the eastward, with Le Cromic open of the northern end of Morgol, which will lead into the Four channel, leaving the Petit Pourceau, as well as various ledges, rocks, and shoals, forming the Pourceaux bank, the northern extreme of which is marked by a red spire buoy, on the port side; and the Petit Courleau, which dries 15 feet at low water, and other dangers, on the starboard side.

In cases of necessity and with the aid of the chart, the channel may be approached from the southward, between the rocks composing the Chaussée des Pierres Noires. The passages between Boufouloc and Pierres Noires, the Siège, and Kérouroc are apparent, and may be navigated by small steam vessels without danger.

The IROISE is the name given to the approach of Brest and Douarnenez bays; the depth of water over the outer part varies from 45 to 25 fathoms, but the inner part is encumbered with various shoals, the position of which, and the depth of water, will be best understood by referring to the chart. It is bounded on the north by the Chaussée des Pierres Noires, on the south by the Chaussée de Sein, commonly called the Saints, and on the east by an irregularly formed promontory which projects westward from the main land, separating and forming the above bays. Its northern projection is named the Presqu'île de Kélernn, and protects the bay of Brest.

The land of this promontory is high and steep, and many of its points projecting into the sea, are encumbered with rocks, and dangerous to approach. Toulinguet point, the western extreme of the promontory, is steep and cliffy, having on it a lighthouse. Nearly 2 miles to the southward is a point off which lie 5 or 6 large rocks named the Tas du Pois, and between them and Dinant point to the south-east is the Anse de Dinant. Cap de la Chèvre, 4 miles to the south of Dinant point, is the southern point of the promontory and the northern headland of Douarnenez bay.*

Anchorage.—About $1\frac{1}{2}$ miles eastward of Toulinguet point, is Grand Gouin, the western point of Anse de Camaret, in which there

* See Admiralty chart, Brest Roadstead, No. 2,690; scale, $n = 1.5$ inches.

is good anchorage in 8 or 9 fathoms, muddy bottom, sheltered from all but north-westerly winds. Capucins point, the north-extreme of this bay, is the south point of entrance to Goulet de Brest.

On the north side of the Iroise, near the Pierres Noires, there is anchorage in fine weather and easterly winds ; but the water is inconveniently deep.

There is good anchorage in 6 and 7 fathoms, sand, with the abbey on St. Mathieu point bearing S.E., and Kermorvan point N.E. by N. ; but when working for this anchorage take care to avoid the Renard rocks and the small reef near the shore north of St. Mathieu point named Loquejou. (*See page 34.*)

The Anse de Bertheaume between Créarc'hmeur point and Minou point, which latter is the north-western point of the Goulet, was formerly the outer anchorage of Brest ; it affords shelter from all northerly winds, in 7 or 8 fathoms water. The shores of this bay and the adjacent coasts are studded with forts and batteries.

LIGHTS.—The lights seen from a vessel approaching the Iroise, in addition to those of Ushant, St. Mathieu, Kermorvan, and Pierres Noires already described in pages 20 and 31, are the following :—

Minou point.—On Minou point at the northern side of the entrance of the Goulet de Brest, is a circular tower from which is exhibited at an elevation of 105 feet above high water, a *fixed white* light, visible in clear weather from a distance of 17 miles.

Portzic point.—On Portzic point, the same side of the Goulet and $3\frac{1}{2}$ miles eastward of Minou point, is an octagonal tower, from which is exhibited at an elevation of 184 feet above high water, a *fixed white* light varied by a *flash* every *three minutes*, visible in clear weather 20 miles. The flashes are preceded and followed by short eclipses, which do not appear total within 8 miles.

Capucins point.—On Capucins point, the north extreme of Anse de Camaret, is a square tower, from which is exhibited at an elevation of 207 feet above high water, a *fixed white* light, visible in clear weather from a distance of 13 miles, through an arc of 13° or between the bearings of East northerly, and E. by S. (this bearing leads southward of Royale and Large shoals). To the northward a narrow ray of light is shown over the position of Les Fillettes rocks.

Toulinguet point.—On Toulinguet point is a square tower, from which is exhibited at an elevation of 308 feet above high water a *fixed red* light, visible 6 miles.

Tevennec island.—On Tevennec island, north entrance of Raz de Sein, is exhibited a *white* and *red* light, occulting at intervals of *four seconds*. It will appear *white* between the bearings of N. $\frac{1}{2}$ E. and N. by W., or between the rock of Cornoc Bras and La Vieille rocks; *red* from N. by W. to N.W. $\frac{3}{4}$ W., and *white* from N.W. $\frac{3}{4}$ W., through West and South, to E. by S. $\frac{3}{4}$ S., and from the last-named bearing to N. $\frac{1}{2}$ E. it will be obscured. It is elevated 92 feet above the level of high water, and in clear weather the white light should be seen from a distance of 13 miles.

La Vieille.—From the lighthouse on La Vieille is exhibited a *fixed* light visible, through the following sectors:—

Three sectors of *white* light between the following bearings—the first from S. 49° W. to S. 3° E.; the second from S. $37\frac{1}{2}^{\circ}$ E. to S. 56° E.; the third from N. 54° E. to N. 24° W.*

Two sectors of *red* light between the following bearings—the first from S. 3° E. to S. $37\frac{1}{2}^{\circ}$ E.; the second from N. 24° W. to Coumoudoc point.

Lastly one sector of *green* light from S. 56° E. to N. 54° E.

Ile de Sein has a round tower standing on the north point of the islet, from which is exhibited, at an elevation of 148 feet above high water, a *fixed white* light, varied by a *flash* every *four minutes*, visible 18 miles. A sector of *red* light is shown through an arc of 31° , or between the bearings of S. 66° W. and N. 83° W., covering the dangers surrounding Tevennec island. The short eclipses, which precede and follow each flash, do not appear total in ordinary weather within a distance of 12 miles. The upper portion of the tower is painted black.

NOTE.—The lights which were formerly exhibited from Pointe du Raz and La Falaise (Bec du Razare) are discontinued, but the lighthouse on Falaise is maintained as a landmark.

Ar-Men rock.—A *fixed white* light is exhibited from a tower on the rock, at an elevation of 94 feet above high water (110 feet above the rock), and should be visible in clear weather from a distance of 16 miles. During thick and foggy weather, a steam trumpet gives a blast every minute of about 5 seconds duration. (See fog signals, p. 2.)

Life boats.—There is a life-boat station at Toulinguet point, Pointe du Raz, and at Ile de Sein.

* A faint light is seen eastward of the bearing S. 49° W., or the eastern limit of the northern sector of *white* light, as far as pointe du Van.

DANGERS in the IROISE.—The approach to the Goulet de Brest is bounded on the north side by the Chaussée des Pierres Noires, Le Coq, and the Basse Beuzec.

Le Coq rock, which is steep-to, dries $4\frac{1}{2}$ feet at low water, and lies south-east $1\frac{3}{4}$ miles from St. Mathieu point two-thirds of a mile off shore, with the Chateau de Bertheaume in line with Créac'h Meur point bearing E. by N. $\frac{1}{2}$ N., and a beacon on the shore between the Pignons de Kéravel N.N.W. $\frac{1}{2}$ W. Midway between Le Coq and the shore is a shoal spot of $5\frac{3}{4}$ fathoms. Le Coq rock is marked by a black buoy.

Basse Beuzec is a patch with 5 feet over it, lying E. by S. $\frac{3}{4}$ S. $1\frac{1}{4}$ miles from Le Coq, with the Chateau de Bertheaume bearing N.N.E. distant rather more than a mile. Basse Beuzec is marked by a black buoy on its east side.

To the southward and eastward of the above shoals, and on the south side of the approach to the Goulet de Brest, is an extensive group of dangers, having among them numerous passages, which should not be attempted by a stranger. The outermost of these La Vandrée, a small patch with 6 feet water over it, is marked on its north side by an automatic whistle buoy (frequently adrift) 220 yards from the shoal, and a red spire buoy marks its north-eastern side. A ridge of foul ground, having 10 to 19 fathoms water, and steep-to, extends one mile from La Vandrée in a westerly direction, and half a mile E.S.E. from it, is a small patch with 5 fathoms water over it named Le Goémant; and three-quarters of a mile N.E. by E. from La Vandrée, is another patch with $4\frac{1}{2}$ fathoms named the Basse de l'Astrolabe.

Le Parquette is a rocky patch, marked by a beacon 23 feet high, lying South 4 miles from St. Mathieu lighthouse, and W. $\frac{1}{2}$ N. northerly, $4\frac{1}{4}$ miles from Toulinguet lighthouse. It is generally above water, and when covered the sea breaks, except in calm weather; another small head that uncovers 6 feet at low water, lies E. by S. $\frac{1}{4}$ S. about $1\frac{1}{2}$ cables from it; and there is a patch having $7\frac{1}{2}$ feet water in the same direction and half a mile from Le Parquette.

The passage between Le Parquette and the Basse de l'Astrolabe is $1\frac{1}{4}$ miles wide, with 15 to 21 fathoms water, but the navigation between La Parquette and Toulinguet point is dangerous from the many rocky heads which rise from the bank extending from Toulinguet point, several of which are seen at low water. The principal rocks are the Trépied, Louzaouennou, Corbeau, Corbin (the latter always above water), Pélen, Mendufa-bian; and a small high

rocky islet named Toulinguet, half a mile W.S.W. of Toulinguet point. Pélen rock is marked by a stone tower, painted red and black, surmounted by a spherical vane 15 feet above high water. The bank lies in an east and west direction, about $2\frac{1}{2}$ miles in length and $1\frac{1}{4}$ miles in breadth.

Le Trépied, which uncovers 9 feet at low water, lies with the south extreme of the Lignes de Kélernn just over Grand Gouin point bearing E. $\frac{3}{4}$ S. and Lochrist church in line with fort St. Merzan N. by W. $\frac{1}{4}$ W. Le Trépied is marked by a red buoy which is $2\frac{1}{2}$ miles S. by W. $\frac{1}{2}$ W. of the buoy on Basse Beuzec, on the north side of the passage.

To the southward of these dangers are other shoal patches, the relative positions of which are best seen by referring to the chart. The outer or south-western being the Basse de l'Iroise and Guepratte shoal. Basse de l'Iroise, with 4 fathoms water, lies S.S.W. $\frac{1}{4}$ W. $2\frac{1}{2}$ miles from the shoal patch of La Vandrée, with Roscanvel mill in line with the north rock off Toulinguet point, bearing E. by N. $\frac{1}{4}$ N.

Guepratte is a shoal, of small extent, with 5 fathoms water, and 20 to 27 fathoms round it, lying $1\frac{5}{8}$ miles West from Basse de l'Iroise.

Basse du Lis lies E. $\frac{1}{4}$ S. nearly $2\frac{1}{2}$ miles from the Basse de l'Iroise, with one to $3\frac{1}{2}$ fathoms water, and is marked by a red buoy. It is about a quarter of a mile in extent, and from the shallowest part Lochrist church is in line with the western Pignon de Keravel, bearing N. by E. and St. Sebastien mill in line with the summit of the Toulinguet rocks bearing E.N.E. The bank is steep-to with 18 and 20 fathoms round it.

The Passage du Toulinguet is formed between the Toulinguet rocks and La Louve, with a beacon on it, at the extremity of the ledge extending from Toulinguet point, the narrowest part of the passage is less than a quarter of a mile wide. Approaching it from the southward and westward, be careful to avoid the southern 2 feet patch of the Pélen, by not bringing Pen-hir point to bear southward E. by S. $\frac{1}{2}$ S. until about three-quarters of a mile from that point; then skirt the shore and pass between the Toulinguet rocks and the point of the same name, but rather nearer the former.

The Passage du Petit Leach lies between the Pélen, Mendufas, and Toulinguet rocks on the one side, and Petit Leach and Le Corbin on the other. Petit Leach is marked by a stone tower, 6 feet above high water, surmounted by a spherical vane. To run through this passage bring Roscanvel mill in line with the northern rock of Toulinguet point bearing E. by N. $\frac{1}{4}$ N., and steer

for it until the west extreme of Cape de la Chèvre is seen midway between the two outer rocks of the Tas de Pois ; then steer to the north-eastward. The summit of the road to Paris, behind the town of Brest, seen exactly in the middle of the Goulet, bearing E.N.E. nearly, leads also through in mid-channel clear of all danger.

The Passage du Corbeau, westward of the latter, is narrow but deep. It lies between the Corbeau, which uncovers 14 feet at low water, and the Pontchou bank, over which the depths are 6 to 12 feet.

These passages may be used by pilots and mariners with local knowledge.

Tides.—In the centre of the Iroise the tides have not much apparent strength, but their rapidity increases on approaching the openings of the Ushant channels and the Raz de Sein. The varying force of the tidal streams, in consequence of the influence of winds, renders the navigation of the Iroise difficult in thick weather, and under such circumstances it is recommended to anchor when practicable.

About 6 miles S.W. of Ushant the current sets to the north during the flood, and to the south during the ebb tide. Between the Jument of Ushant and the Grande Pierre Noire, the flood sets to the N.W., and it sets to the northward from the Grande Pierre Noire up to point St. Mathieu, and in the Goulet from that point.

BREST is a strongly fortified town, and one of the chief naval arsenals of France. It is very advantageously situated near the west extreme of the department of Finistère, and on the north side of one of the finest ports in the world, nearly land-locked, accessible only through a narrow and well fortified passage, the Goulet, and extending far inland in two branches, one running up to Landerneau, the other towards Châteaulin.*

The town stands on the summit and sides of a kind of projecting ridge, and some of its streets are too steep to be passable except on foot. It is situated on the left bank of the Penfeld river, which is a small stream flowing into the northern part of Brest road, and the communication is kept up with its suburb Recouvrance on the right bank by a bridge 65 feet above high water. The whole is encircled by ramparts, which, being planted with trees, form agreeable promenades, and afford a fine view of the port and shipping. The population, in 1886, including the suburb, was 70,778.

* The rock at the entrance to the harbour of Brest has been partially removed and there is now a depth of $5\frac{1}{4}$ fathoms at low water.

The chief exports are grain, bones, potatoes, iron, and resin ; the average value for the years 1885 and 1886 being £15,393. The chief imports are wine, oil, coal, iron, wheat, &c. ; the average value for the years 1885, 1886 being £465,667.

The average number of vessels of all nationalities that entered the port during 5 years—1882-6—amounted to 245, representing an aggregate tonnage of 52,094.

There is steam communication to the principal ports of France and railway communication by the West and Orleans lines and the different branches.

The Government telegraph to everywhere in Europe. The Anglo-American Telegraph Company, and the French Telegraph Company, from Paris to New York, have offices in Brest.

There are no special Custom-house regulations, but the brokerage charges are extremely onerous. There are also no special quarantine regulations, and the use of the lazaret is granted gratis. There are no diseases against which special precautions are necessary, but when the winter is a particularly damp one, cases of typhoid fever are somewhat frequent.

Sailors can obtain admissions to the Civil hospital through their respective Consuls. There are no sailors' homes.

There is no difficulty in obtaining all necessary supplies.

The climate of Brest is generally damp ; there is neither excessive heat nor severe cold, and the general directions of the winds are from S.W. to N.W., but S.Wly. winds are most frequent.

Coal.—About 3,000 tons of coal are kept in stock, the average price being 20 shillings a ton. The coaling of steamers is an extremely easy operation, being done alongside a wharf, with an available depth at low water of 24½ feet.

Time signal.—At the Observatory of the Nautical schools, a flag is hoisted half mast at 5 minutes before signal, and hauled down at 10h. 0m. 0s. a.m., Paris mean time, corresponding to 21h. 50m. 39s., Greenwich mean time. Signal is repeated after an interval of 2 minutes.

Dockyard.—The mouth of the Penfeld is reserved exclusively as a port for vessels of the French navy, and although there are 30 feet in it at low water, it is narrow, and vessels lie in a single tier. The dockyard is on both sides of the river, and consists of graving docks, victualling department, and seamen's barracks. Above the dockyard is the naval hospital.

Government Docks.	Length.		Breadth of Entrance.	Depth over sill at H.W.S.T.	Rise of Tide.	
	On blocks.	Over all.			Springs.	Neaps.
No. 1 - - - -	Feet. 246½	Feet. 286	Feet. 74½	Feet. 20 (about)	Feet. 19	Feet. 13½
" 3 - - - -	220½	260	74½	19 (about)	—	—
" 1 and 3 together -	—	526½	—	—	—	—
" 2 - - - -	—	241½	75	11 (about)	—	—
" 4 - - - -	—	265½	75	11 (about)	—	—
" 2 and 4 together -	—	523½	—	—	—	—
" 5 - - - -	—	358½	84	31 (about)	—	—
" 6 - - - -	—	223½	65½	10 (about)	—	—
" 7 - - - -	375	398	111½	28½ (about)	—	—
" 8 - - - -	324½	347½	111½	—	—	—
" 7 and 8 together -	—	743½	—	31 (about)	—	—
" 9 - - - -	—	319	85½	31 (about)	—	—

The use of the Government dry docks can always be obtained through the Consul.

In addition to the Government establishment, there are facilities in the wet dock for repairs to either hull or machinery.

There is a gridiron 361 feet long, and another 105 feet long.

Commercial Port.—The commercial port, or port Napoleon, eastward of the mouth of the Penfeld, is an extensive artificial harbour, adapted for merchant vessels of large size, containing five inner basins. A large white conical buoy is moored opposite the N.E. basin, for the convenience of vessels getting under weigh. This is the established landing place for boats of foreign men-of-war.

There are 7,550 feet of quayage.

LIGHTS.—A white iron turret on the northern jetty, at the entrance to port Napoleon, exhibits at a height of 33 feet above high water a *fixed green* light.

A similar turret on the southern jetty shows a *fixed red* light at the same elevation. Both lights should be visible in clear weather at a distance of 5 miles.

At the southern, or last-mentioned turret, a fog bell is sounded in thick weather. The bell is sounded 14 times, then an interval of six seconds; then two strokes; again an interval of six seconds, then 14 strokes, &c. (*See fog signals, page 2.*)

On the eastern pier head of the commercial port, a *fixed white* light is exhibited from an iron stand, at an elevation of 22 feet above high water, and should be visible in clear weather from a distance of 7 miles.

A *fixed green* light is exhibited on the west side of Penfeld river entrance.

THE GOULET, or entrance to Brest roads, is a strait formed by the north shore of the Presqu'île de Kélermn on the one side, and the coast between Minou and Portzic points on the other. It is nearly one to $1\frac{1}{4}$ miles wide; the shores on both sides are steep-to, and may be coasted at a distance of about 3 cables. There are from 11 to 25 fathoms in the navigable channel.

Dangers.—The dangers to be avoided in sailing through are the Fillettes, Goudron, and the Mengam, all of which lie in mid-channel.

The Fillettes rocks lie at the west end of a shallow bank, and uncover 5 feet at low water, and its north side is marked by a buoy striped red and black. The Mengam lies a mile farther eastward and does not cover except at very high springs; it is surmounted by a beacon 26 feet high. Directly in a line between these dangers is the Goudron, a rocky bank on the extremes of which there are not more than 2 and 3 feet water. The passage between these rocks should not be attempted, there being several others under water. The approaches to Brest are marked according to the French system of buoyage. *See* page 5.

Tides.—The tides run strongly in and out through the Goulet, and springs at about 3 miles an hour.

Telegraph Cables.—There is a submarine cable to England, and two to St. Pierre.

RADE de BREST.—This extensive roadstead or harbour, which will admit vessels of the heaviest draught, contains an area of about 15 square miles, but its breadth varies considerably from the irregularity of its shores, and in some places it is over 3 miles across. There are numerous streams running into it, one of which, the river Chateaulin, is navigable for steamers. In taking up a berth, if the vessel is of large draught, avoid the Banc de St. Pierre; on one part of it there are only $4\frac{1}{2}$ fathoms of water. If anchoring in the southern part of the harbour, care must also be taken to avoid a small patch with 9 feet water on it, called the Basse du Renard, which is marked by a buoy; it has 9 fathoms close to and lies $1\frac{1}{4}$ miles southward of the Banc de St. Pierre, in a direct line

between the Cormorandière rock and Ile Ronde, distant from the latter about three-quarters of a mile.*

Storm and Weather signals, the latter, as described on page 3, are shown from the entrance of the Man-of-war harbour, and at St. Mathieu point.

Tides.—It is high water, full and change, at Brest at 3h. 47m., springs rise $19\frac{1}{2}$ feet, and neaps $14\frac{1}{2}$ feet. In the Rade de Brest the currents are very variable.

Directions.—Vessels bound to Brest, and being in the fairway, should bring Minou and Portzic lighthouses in line bearing E. $\frac{1}{4}$ N., which leads southward of all dangers of the Chaussée des Pierres Noires, Le Coq, and Basse Beuzec; and northward of La Vandrée, La Parquete, Le Trépied, &c., to the entrance of the Goulet. Then run along the north shore at the distance of about a third of a mile between it and the shoals in mid-channel. When the town of Brest is seen open of Portzic point, haul up, and anchor off it in 8 or 9 fathoms water, muddy bottom; or to the southward of the Banc de St. Pierre in 10 or 15 fathoms.†

* **Anse du Fret.**—Beacon.—A wooden beacon, surmounted by a barrel, painted in red and white horizontal stripes, and elevated 5 feet above high water, stands on the extremity of Roche Noire mole, south shore of Rade de Brest.

† The French Government has given Notice, dated 18th August, 1890, that the following buoys will shortly be placed to mark works in progress between pointe du Portzic and the entrance to Brest harbour; and that the buoys will be moved as the works advance :—

(1) A buoy, painted black, will be placed at the extremity of the works, in progress, for the extension of the outer (eastern) pier of Les Quatre Pompes harbour, which will be constructed in a direction S. 32° E., for a distance of about 220 yards.

This buoy will be moored on the line of the pier, with the south-west angle of the present outer pier bearing N. 32° W., distant 125 yards.

Vessels should pass to the southward of this buoy.

(2) Two buoys will be placed to mark the extremities of the central portion of a breakwater, to be constructed eastward of Les Quatre Pompes pier, and to be about 1,640 yards in length, in a S. 88° E. and N. 88° W. direction.

The eastern buoy will be a *light*-buoy, painted black, moored with Portzic light-house, bearing S. 88° W., distant about 2,460 yards; and Batterie de Kerang off N. by E.

The Western buoy, painted red, will be moored with the above light-buoy bearing S. 88° E., distant $2\frac{1}{4}$ cables.

Vessels should not pass between these two buoys.

NOTE.—By day, vessels may pass between the black buoy marking Les Quatre Pompes pier works, and the red buoy at the western end of the breakwater works; but the buoys should not be approached nearer than half a cable. Vessels should not anchor within half a cable of either the pier or breakwater works. By night, vessels should keep to the southward of the line joining pointe du Portzic light and the light-buoy marking the eastern extremity of the breakwater works in progress; or, in the event of the light of the buoy being extinguished, should keep pointe du Portzic light, bearing northward of West, until the green light at the western entrance of Brest harbour bears N. by E. $\frac{1}{4}$ E.

The Coq will be avoided by keeping the north end of Beniguet isle open of St. Mathieu point, until the Pignons de Kéraval is seen open to the eastward of the beacon on the shore.

The Beuzec may be passed on either side, and if convenient a vessel may run to the northward of it, and cross the entrance of Bertheaume bay. In the Goulet, the Filletes, Goudron, and Mengam banks may also be passed on either side. In entering the Rade de Brest, give Espagnols point a wide berth, so as to avoid La Cormorandière rock, which is always uncovered.

At Night.—The *fixed white* light on Capucins point is only seen between the bearings of E. by S., and East, northerly, and when kept in sight clears all dangers. The lights on Minou and Portzic points in one, bearing E. $\frac{1}{4}$ N., is the leading mark towards the Goulet; when on this line and within a mile of the former light, a vessel should steer a little to the southward, so as to give the point a berth of about a third of a mile, and then steer on for the Portzic light.

ANSE de CAMARET is formed between Capucins, the south point of entrance of the Goulet and Grand Gouin point, 2 miles south-west of it. The bay is about a mile deep, with 5 to 6 fathoms water, over sand and mud, and free from danger. The town and small port of Camaret is in the south-west corner of the bay, but as the latter dries 4 or 5 feet at low water, it is only adapted for small vessels, which lie sheltered from all winds. The port is protected by a peninsula several yards above high water, and near its extremity is the chapel of Nôtre Dame de Roch Madou, a small fort with moats and a drawbridge. Vessels of 150 to 200 tons, drawing less than 12 feet, can enter the port, but cannot at times approach the quays. The bay affords shelter from all winds except the north. The prevailing winds in the fine season are N.W., N.E., and S.E., but towards the equinoxes, and during winter, severe northerly gales are common, when the bay should be avoided. There are numerous batteries along the shore. This port is rather important as a fishing station, and especially as a place of call. Its situation renders it a refuge for vessels which are prevented by heavy weather, adverse winds or currents, from entering the goulet of Brest. Notwithstanding the advantages which the port and road of Brest offer with respect to shelter, coasters generally prefer to put in at Camaret which is easier and quicker of access, and from where they may put to sea whenever the weather permits.

Buoys.—There are several mooring buoys in the bay.

Depth of water.—There are from 5 to 6 fathoms water, over sand and mud, in Camaret bay, and it is free from danger. Port Camaret dries 4 or 5 feet at low water.

Tides.—It is high water full and change at Camaret at 3h. 36m.

Light.—A *fixed green* light, 35 feet above high water, is exhibited from the light-house at the end of Sillon jetty, and should be seen in clear weather from a distance of 5 miles. The light is visible only from S. 19° E. to N. 7° W., marking the anchorage.

Coast.—Toulinguet point, $1\frac{1}{4}$ miles westward of Grant Gouin point, is bordered by a ledge of sunken rocks extending about a cable from the point; the narrow passage between this ledge and the Toulinguet rock has from 6 to $4\frac{1}{2}$ fathoms water in it. In the bay between Toulinguet and Pen-hir points, there is anchorage off the sandy beach in 5 to 7 fathoms water, sand, with the extremity of Toulinguet point bearing about North, distant half a mile.

Pen-hir point, $1\frac{1}{4}$ miles southward of Toulinguet point, is steep and rocky, and off its south extreme are five or six large rocks named Les Tas de Pois. They extend nearly two-thirds of a mile in a south-west direction from the point, are always above water, and steep to on all sides; but there is a patch, Basse de Dinant, with 8 feet water, half a mile S.E. by E., from the outermost rock. From these rocks the shore bends round to the E.S.E., forming the two small sandy bays of Pen-hir and Dinant.

From Dinant point, the south extreme of Dinant bay, the coast trends in a southerly direction 4 miles to Cape de la Chèvre which has some small rocks scattered about it, also a sandy spit with $2\frac{1}{2}$ to 6 fathoms water, extending about a mile in a W. by S. direction. Between these points there are several dangerous rocks lying from about one to 4 miles from the shore.

Basse Ménéhom, which is $1\frac{1}{4}$ miles eastward of the Basse du Lis (page 40), consists of three rocks, extending about three-quarters of a mile in an E.N.E. direction. The S.W. rock, with 13 feet water over it, lies with Lochrist church, bearing N. $\frac{1}{4}$ W. St. Mathieu lighthouse N. $\frac{3}{4}$ W., and Toulinguet lighthouse N.E. by E. easterly. The N.E. rock, with $3\frac{1}{2}$ fathoms lies with St. Mathieu lighthouse bearing N. by W. $\frac{1}{4}$ W., and Toulinguet lighthouse N.E. by E. The third rock, having $3\frac{3}{4}$ fathoms over it is nearly midway between them.

La Chèvre, Le Chevreau, and Le Bouc, are three rocks rising respectively about 3, one, and 4 feet above the surface at high-

water springs, with deep water around them. The first of these rocks lies W. $\frac{3}{4}$ N. a long mile from the southern extremity of Dinant point; and the second W. $\frac{1}{2}$ S., 6 cables beyond it; the third bears N.W. $\frac{1}{2}$ N., rather more than $2\frac{1}{2}$ miles from the western extreme of cape de la Chèvre.

Basse du Bouc, is a small patch of 6 and 9 fathoms lying about three-quarters of a mile W. by N. from Le Bouc, with deep water of 16 and 17 fathoms all round it.

Ile de Guénéron which is small, lies near the shore, but there is no passage between it and the main land, except for boats.

Basse Vieille uncovers about 5 feet at low water, and is steep-to, having 12 and 17 fathoms close around. It lies with Kidizient mill in line with a small rock, named Men Cos, lying off the south-east extreme of Cape de la Chèvre, bearing E. by N. $\frac{1}{2}$ N., and the western Tas de Pois in line with the Toulinguet rock, bearing N. $\frac{1}{2}$ E. It is marked by a black buoy.

Basse Laye, a rock having less than 6 feet of water over it, lies S.S.E. $\frac{1}{2}$ E. 9 cables from cape de la Chèvre, and S.W. $\frac{1}{4}$ S. two-thirds of a mile, from the Men Cos rock.

BAIE de DOUARNENEZ.—This bay is 10 miles deep and about 7 miles wide. The soundings decrease from 18 to 8 fathoms, sand, shells, and mud, and the entrance is so wide that no leading mark is required to enter, provided a berth is given to the Basse Vieille, and the foul ground off cape de la Chèvre on the north. The tower of the lighthouse on La Vieille rock in the Raz de Sein, shut in by Pointe du Van, is a good mark for clearing Basse Vieille to the southward, in the day time.

Dangers.—In the northern part of the bay there are several rocks, some of which are uncovered, whilst others appear only at low water. The outermost of these is La Pierre Profonde, which is always above water; a little to the northward of it are Le Taureau, which uncovers 5 feet, and the Basse Rip, a knoll with 5 fathoms water. About half a mile eastward of the Taureau are Les Verrès, north of which, and near Laber isle, is the Laber rock, always showing above water. This rock is marked by a stone beacon, 6 feet above high water, painted red, and surmounted by a red spherical vane. Elsewhere the bay is clear of dangers, except near the shore.

The village of Douarnenez stands on the southern shore of the bay. Here is a little harbour, to the eastward of the town, called Port Rosmeur, where the small fishing vessels are annually fitted

out for the sardine fishery. This port is reserved exclusively for fishing vessels, but at Port Rhu, in the river Pouldavid, west of the town, merchant vessels load and unload at the quays. The church of Plouaré, on a high hill to the south-east of Douarnenez, is a fine specimen of architecture. Tristan island lies off the village, and about three-quarters of a mile northward of it is the outermost of two small sand patches, named the Basse Muer and the Basse Neuve, the former with 17 and the latter with 8 feet water over it, these shoals lie with the centre of Tristan island in line with Plouaré church.

From Douarnenez the southern shore of the bay trends in a westerly direction for nearly 16 miles to Pointe du Van, the coast being high and steep, with several projecting points, some of which are encumbered with rocks and dangerous to approach.

Anchorage.—For vessels of heavy draught there is fair anchorage off the village of Douarnenez in 5 fathoms; Tristan island light-house bearing W. $\frac{1}{4}$ N. and Plouaré church S.W. by S., but a vessel should be prepared to proceed to sea at the first appearance of bad weather, as with northerly and westerly winds a mountainous sea rises immediately. The prevailing winds are W. and S.W. and gales are most frequent from the W. and N.W. There is good shelter inside the mole for vessels, with good holding ground in 12 feet at low spring tides.*

Basse Jaune.—One mile N.E. of Pointe du Van is the Basse Jaune, a rock which uncovers 2 feet at low water, with $7\frac{1}{2}$ to 10 fathoms around it, and in line with Le Chlec rock—just off Pointe du Van—and the extremity of Pointe du Raz. There is a deep channel between it and the point, but it will be prudent for a stranger to pass to the northward of the rock. A buoy, painted with black and white bands, is moored about one-third of a mile West from Basse Jaune.†

LIGHTS.—On the summit of Tristan island, is a round tower 31 feet high, from which is exhibited at an elevation of 115 feet above high water, a *fixed white* light, visible in clear weather at a distance of 9 miles.

From an iron pillar on the extremity of Rosmeur mole Douarnenez bay, is exhibited at an elevation of 23 feet above high water, a *fixed red* light, visible in clear weather from a distance of 5 miles.

* Rosmeur mole is being lengthened, and a red beacon marks the shoal water. Vessels entering the harbour should pass eastward of the beacon.

† See Admiralty chart:—Brest roadstead, No. 2,690; scale, $m = 1\cdot5$ inches; and sheet 7, Ras de Sein to Ile D'Ouessant, No. 2,643; scale $m = 0\cdot5$ of an inch

Millier point.—A fixed light, 112 feet above high water, is exhibited from the top of a semi-circular projection on the north front of the keeper's house, near the extremity of Millier point south side of Douarnenez bay. The light is visible between S. $73\frac{1}{4}$ E., through south, and N. $86\frac{3}{4}$ W. A *white* sector of $26\frac{1}{2}^{\circ}$, between Jaune and Vieille shoals; a *red* sector of 6° over Vieille shoal; a second *white* sector of 13° between Vieille shoal and Le Bouc rock; obscured through an arc of $16\frac{1}{2}^{\circ}$ over Le Bouc rock and cape de la Chèvre; and a third *white* sector of 105° over Douarnenez bay as far as the rocks off point Jument. In clear weather the *white* light should be seen 13 miles, and the *red* light 9 miles.

A Life boat is stationed at Rosmeur quay.

Directions.—The best leading mark into Douarnenez bay is the high mount of Locrenan (to the south-east), just shut in to the southward of Légiède point, which is about $1\frac{1}{4}$ miles westward of the village of Douarnenez. This will lead to the southward of the Basse Vieille, the marks for which should be kept open. The town of Crozon, on the north shore of the bay, is distinguished by a high black tower, and the village of Beuzec on the south shore by a church with a high Gothic spire. If making for the anchorage off Douarnenez in hazy weather, the Plouaré church steeple forms a conspicuous mark, and is very often distinguishable before Tristan island. On advancing into the bay, mount Locrenan will appear well cultivated; the village on its side is large and surrounded by trees.

Tides.—The flood tide sets to the E.S.E. along the south shore of Douarnenez bay, and near cape Chèvre, on the north shore, it sets E.N.E., and follows the trend of coast round the head of the bay. The ebb currents flow in the contrary direction to the flood. In spring tides the velocity of the current off cape Chèvre is 2 miles per hour, and gradually diminishes in strength towards the head of the bay.

POINTE du RAZ.—Bec du Raz, marked by a disused light-house.—From Pointe du Van, the south-west extreme of Douarnenez bay, the shore trends nearly south and then west for about $2\frac{1}{4}$ miles to Pointe du Raz, forming the sandy bay of Trépassés. Pointe du Van is surrounded by rocks, and the outer one, named Cornoc an Tréas, three-quarters of a mile from the shore, uncovers at low water.

A chain of rocks, some of which are above water, extend W.N.W. from Pointe du Raz; the largest is named La Vieille or Old Woman, on which stands the lighthouse, and a cable from it and three-quarters of a mile from the shore is La Plate, which is the

outer danger, and uncovers 11 feet at low water. All these rocks are steep-to.*

The CHAUSSEE de SEIN, commonly called the Saints, is an extensive cluster of islands, rocks, and shoals, occupying a space of 11 or 12 miles in length, in a N.W. by W. and S.E. by E. direction, and of an average breadth of $1\frac{1}{4}$ miles. Ile de Sein, the largest island near the eastern end of the Chaussée, is low, flat, and inhabited by a few fishermen. On its north extreme is the lighthouse (page 38), and at its north-eastern part is a small harbour, with gravel and mud bottom, which dries at low tide. It is frequented by coasters, but the many rocky ledges render its approach dangerous to strangers.

Dangers.—The eastern dangers on the Chaussée are named Pont des Chats, (Catsbridge), and Plass ou Normand, and from Le Chat, a rock about 4 feet above high water, which lies S.E. $\frac{1}{4}$ S., nearly $2\frac{1}{2}$ miles from Ile de Sein lighthouse.

Cornoc-ar-Vas-Nevèz rock, about one cable northward of Plass ou Normand, is marked by a stone tower, surmounted by a black spherical vane 10 feet above high water.

Cornoc-an-ar-Braden rock (approach to Ile de Sein from the north-eastward), is marked by a red turret, surmounted by a ball 21 feet above high water. The extremity of the reef is about half a mile eastward of Le Chat. For a distance of about $4\frac{1}{2}$ miles westward of Ile de Sein the Chaussée is studded with rocks more or less above water, and which is named Pont de Sein or Saints Bridge. The western part of the Chaussée is named Basse Froide, having several rocks, which uncover at low water. From the outer or most western $3\frac{1}{4}$ -fathom patch, Ushant north-west lighthouse or *group flashing* light bears N. by E. $\frac{1}{4}$ E., distant 24 miles, and Ile de Sein lighthouse or *flashing* light S.E. by E. $\frac{3}{4}$ E. $8\frac{1}{2}$ miles.

Caution.—The Chaussée de Sein should not be approached too near, as little or no warning is given by the lead, there being from about 30 to 40 fathoms rock and broken shells, within a mile of the bank, and as the tides are strong and uncertain in its vicinity, and probably all the dangers not yet known, the mariner will do well to give it a wide berth. About $3\frac{1}{2}$ miles S. $\frac{3}{4}$ W. from the western danger is a patch with 18 fathoms water over it, named Haut Fond Foquet, on which it is said the sea occasionally breaks. It is of small extent, and has 30 to 33 fathoms close-to.

* It is intended to erect a beacon on La Plate.

Tides.—It is high water, full and change, at Ile de Sein, at 3h. 21m. ; springs rise $17\frac{1}{2}$ feet, and neaps 12 feet. In the Raz de Sein the flood runs nearly due north. To the north and north-west of the western extremity of the Chaussée the flood runs to the N.E. $1\frac{1}{2}$ miles an hour, and the ebb S.W. about one mile an hour, the flood commencing 5h. 50m. after high water at Ushant.

The RAZ de SEIN, between the eastern extreme of the Chaussée de Sein and the chain of rocks extending nearly a mile from Pointe de Raz is about $1\frac{1}{2}$ miles wide, but as there are many dangers to be avoided, it should not be entered by a stranger without a pilot.

Depth of Water.—There are from 11 to 20 fathoms of water in the Raz de Sein, but there are many dangers to be avoided.

Tevennec rock.—The northern part of the passage is divided into two channels by a bank, in the middle of which is a large conspicuous rock, named the Tevennec, from which the lighthouse on the Ile de Sein bears W. by S. $3\frac{1}{4}$ miles. The Tevennec, which is marked by the lighthouse, is surrounded by rocky heads, principally covered, which are the more dangerous in consequence of the tides setting strongly over them.

Cornoc Bras and Masclougréiz.—In the southern part of the passage are two patches, three-quarters of a mile apart, named Cornoc Bras and Masclougréiz, the former with 10 feet over it at low water, and the latter with 27 feet. The Cornoc Bras lies with Ile de Sein lighthouse just over the north-east part of that island, bearing N.W. $\frac{1}{4}$ W. $3\frac{1}{2}$ miles, and Le Chlec the outer and westernmost rock off Pointe du Van, in line with the rock next east of La Vieille, bearing N.E. by E. $\frac{1}{4}$ E. Le Chlec open or shut in with the extremity of Pointe du Raz clears the Masclougréiz.

Directions.—The Ile de Sein and La Vieille lighthouses in line, bearing E.S.E., mark the general trend of the Chaussée de Sein. In approaching these rocks from the westward at night, the first light seen will be the *flashing* light on Ile de Sein, and a single bearing of it will indicate if the vessel is to the northward or southward of the line of direction of the lights. The *green* sector of La Vieille light covers the Chaussée de Sein.

In proceeding through the Raz de Sein from the southward, the Tevennec bank may be passed on either side ; but the eastern channel is considered the best, although the other, with a scant wind, may give a vessel the advantage of laying through without tacking, and the stream within it is weaker. The Vieille rock, in line with a small detached rock off a point southward of Pointe du Raz, bearing S.E.

nearly, is a good leading mark through this passage, borrowing on the Tevennec with the ebb, and on the Saints with the flood.

At night, vessels passing through the Raz de Sein from the southward, should get within the white sector of Tevennec light (page 38), and keep in it until the western *white* sector of La Vieille light is seen ; an E.N.E. course will then lead through the red light of Tevennec into the eastern *white* sector of La Vieille ; a N.N.E. course, or by keeping in the sector of *white* light, will lead clear of all dangers.

From the northward, having La Vieille light bearing S.S.W., keep it so until the red light of Tevennec is seen, when the course should be altered to W.S.W. until the white light of Tevennec opens out, then proceed south in the sector of white light.

Attention must be paid to the currents prevalent in the Raz de Sein, for they are very violent, attaining a velocity of 8 knots at springs, and they are very complex and variable according to the state of the tide ; moreover, they set upon the rocks. The channel should not be attempted in bad weather at spring tides when the winds are against the current, for in this case there is absolutely a raging sea.

The flashing light on the Ile de Sein presents the same appearance as Penfret light—on the island of that name of the Glenan group—but this resemblance cannot be mistaken as Penfret light is within the horizon of Penmarc'h point light, which is a *revolving* light, attaining its greatest brilliancy every *half minute*.

Audierne bay.—The coast from Pointe du Raz trends to the south-east and southward for about 24 miles to Penmarc'h point, forming the extensive bay of Audierne, notorious for its shipwrecks, in which the soundings are from 30 to 6 fathoms ; in the northern part, and $1\frac{1}{2}$ miles from the shore, is a cluster of shallow patches having from 2 to 5 fathoms water over them, with 8 and 9 fathoms between them and the shore, and 13 and 14 fathoms close-to outside. From the $3\frac{1}{2}$ -fathoms patch of Les Ninkinou, Plougof church bears N.E., and Pointe du Raz lighthouse N. by W. $\frac{3}{4}$ W., distance $2\frac{1}{2}$ miles.*

About 5 miles from Pointe du Raz is Cabestan bay, with a sandy beach, which is occasionally visited by small vessels, but it affords no shelter except with off-shore winds. The extreme points of this bay are foul, and the rocks dry at low water ; a detached rock named the Guilcher lies near the north point of the entrance.

Two miles south-eastward of Cabestan bay is the entrance to port

* See Admiralty chart :—Ile de Groix to Raz de Sein, No. 2,645 ; scale, $m = 0.5$ of an inch ; also Bay of Biscay, No. 1,104 ; scale, $m = 0.07$ of an inch.

d'Audierne; thence the land is high until within a few miles of Penmarc'h point, where there is a valley, in which is a village and several churches. To the northward of Penmarc'h point is the small bay of La Torche, in the southern part of which at Portz-carn, small vessels can take the ground without risk when embayed or unable to double the Penmarc'h rocks. About 14 miles south-east of Penmarc'h point are the Iles de Glenan, and 18 miles farther eastward the Ile de Groix, which fronts the entrance of Port Louis. From La Torche bay, round eastward as far as Ile de Groix, the whole coast is studded more or less with dangers, lying nearly 3 miles from the coast and surrounding the Isles de Glenan, for the position of which the mariner is referred to the chart.

PORT AUDIERNE can only be entered at high water, but it shelters vessels, that can take the ground, from all winds, and is the only refuge afforded to vessels throughout the whole extent of Audierne bay. The town of Audierne stands on the west bank of the river Goyen, about three-quarters of a mile from the entrance; it extends along the foot of a hillock which shelters it as well as the port, against the West and S.W. winds, the worst in this region. It is the chief town of an important parish of the Canton of Pont-Croix. To the south of the town is the garden and old convent of the Capuchins. On Raoulic point, at the west side of entrance, is a battery and a jetty constructed on its projecting rock.

The bar dries 4 feet at low water.

La Gamelle.—Fronting the port about a mile from the entrance is a rocky bank, named La Gamelle, which dries 5 feet at low water; a red buoy marks its western, and a black buoy its eastern edge—the position of these buoys cannot always be depended upon; vessels entering the harbour may pass on either side of this bank, but between it and the shore there are several patches of sunken rocks.

Basse Fornio, with 9 feet water, is the most easterly of the shoals at the entrance to port Audierne, and is separated from La Gamelle by a narrow channel.*

LIGHTS.—A *fixed red* and *white* light, elevated 36 feet above high water, and visible 6 miles, is exhibited from a tower on the extremity of the jetty on Raoulic point. The light shows *red* westward of the bearing N. 53° E., covering la basse du Pouldu, to the land of point de l'Ervily, and *white* eastward of that bearing.

* See Admiralty plan; Port D'Audierne, on chart. Ile de Groix to Raz de Sein, No. 2,645.

Leading lights.—Two fixed lights are exhibited from Kergadec and Trescadec beacons, north-westward of point de Raoulic.

The rear light on Kergadec beacon is *red*, and visible seaward ; the front light on Trescadec beacon is *green*, and visible between the bearings of N. 42° E. and N. 6° E., and bears S. 24° W. from the rear light. The lights in line bearing N. 24° E. lead through the Mauvais Temps (Grand) channel into port Audierne.*

A life boat is stationed at port Audierne.

Tides.—It is high water, full and change, at port Audierne, at 3h. 15m. ; springs rise 13 feet, and neaps 6½ feet. The currents are very slight in the neighbourhood of Audierne, except in the river.

PENMARC'H ROCKS are a group of dangers that surround Penmarc'h point and extend several miles along the coast to the eastward. These rocks, many of which are above water, lie 1¼ to 2½ miles from the shore, having between them passages for small vessels, but they are dangerous, and cannot be used by a stranger.

There are depths of 20 to 30 fathoms sand, gravel, and shells close to the outer edge of Penmarc'h rocks.

Men-Talec rock, lying south of the mole at Kerity Penmarc'h, is marked by an iron beacon, 6 feet above high water, painted black, and surmounted by a black spherical vane, and Ragnen rock lying nearly 2 miles south-east of Kerity is similarly marked.

Tides.—It is high water, full and change, at Penmarc'h rocks, at 3h. 16m.

Port Gullfneec, situated about 4 miles E.S.E. of Penmarc'h point, dries at low water, but is available for vessels of 8 feet draught ; its approach is difficult, and should not be attempted without local knowledge or the assistance of a pilot ; it is principally a resort for fishing and small coasting vessels.

Spinec shoal (shoal of Chiens de Mer), lying south-east of Penmarc'h point, is marked on its south-west side by a large black spindle buoy, moored half a cable from the shoal.

Landmark.—A mast, 22 feet high, surmounted by a vane painted white, stands on the downs of Toul-ar-Ster, about three-quarters of a mile east of Kerity, Penmarc'h.

LIGHTS.—Near the church of St. Pierre, on Penmarc'h point, is

* A pyramid, painted white, has been erected on the site of the former beacon light near the garden of the Capuchin convent, and when in line with Raoulic point jetty lighthouse leads into the port.

a circular tower, which exhibits, at an elevation of 135 feet above high water, a *revolving white* light, which attains its greatest brilliancy every *half minute*. The light is visible in clear weather from a distance of 18 miles; in ordinary weather the eclipses will not appear total within the distance of 12 miles.

On the eastern point of the entrance of port Guilfinec, two *fixed* lights are shown W. by S. $\frac{1}{2}$ S. and E. by N. $\frac{1}{2}$ N. of each other, and 620 yards apart. The upper or easternmost light, shown from a rectangular white tower, elevated 50 feet above high water, exhibits a *white* light, visible in clear weather through an arc of 16 degrees on each side of the centre of the channel, and, if the observer be in the centre of the channel, should be seen from a distance of 9 miles.

The lower or westernmost light, shown from a square white tower, elevated 20 feet above high water, exhibits a *red* light, and should be seen 6 miles in clear weather.

The GLENAN ISLANDS are an extensive group of islands and rocks within which there is no anchorage nor passage, unless for vessels of light draught, which must pass within range of a fort, said to be bomb-proof, which stands on Cygogne islet, near the centre of the cluster. The security of this defence lies in its being surrounded with water, which is, in places, so shallow that a man may cross to the rocks and islands next to the north-west.

The largest and principal islands of the group are Penfret, St. Nicholas, Loc'h, Drenec, and Castel-bras. Penfret, the most easterly and largest, is nearly a mile long, low in the middle, but rises at each end, so as to form two hills. A lighthouse 72 feet high stands on its northern end, and a semaphore on the southern. On the rising ground of the island are several large gardens, near which are three wells of excellent water, whence from 30 to 40 tons have been obtained daily. There are sandy bays on both sides of the island, and boats may always land to leeward. The islands are destitute of wood.*

La Jument, the southernmost of the dangers of this group, is a reef half a mile in extent, the eastern part of which is the shoalest, one part being awash at the lowest tides; the depth increases quickly to the southward, but between the reef and the islands there are various sunken rocks.† From the shoalest part, St. Philibert church is in line with the low south point of Penfret island, bearing N.E. by E. $\frac{1}{4}$ E., and the flagstaff on fort Cygogne seen nearly over the middle of the

* There is a conspicuous factory on Loc'h island, useful as a landmark.

† Men-Goë rock, south of Loc'h island, is marked by a stone beacon.

Loc'h, a low flat island, bearing N.E. by N. A black spire buoy is moored about 300 yards to the southward of the shoalest part.

Basse an Ero, marked on its south-east side by a black buoy, is a small reef awash at low water, lying $3\frac{1}{4}$ miles eastward of the Jument, with the highest of the rocks south-east of Penfret, about 3° open of the north-east part of that island, N. $\frac{1}{4}$ E.; and the upper part of a remarkable peaked rock, which is seen just over the south point of Loc'h island, N.W. $\frac{1}{4}$ N.

Laouenou patches.—About $1\frac{1}{4}$ miles southward of this reef are some patches with 5 to 8 fathoms water, named the Laouenou, having 10 and 15 fathoms close to, and 30 fathoms at the distance of about half a mile to the east and south of them.

Basse Pérenés, with 11 feet water, is the westernmost danger of this group, and lies $3\frac{1}{4}$ miles N.W. from La Jument.

Bluiniers rock, lying N.E. $\frac{1}{4}$ E. $2\frac{1}{2}$ miles from Basse Pérenés, is marked by a stone tower, 5 feet above high water, surmounted by a spherical vane. The upper part of the tower is painted red and black.

Basse Jaune.—At about 3 miles S.E. by E. from Penfret are several shallow rocky patches at the east end of an extensive bank named the Basse Jaune, one of which uncovers one foot at the lowest tides, marked on its eastern side by a black buoy. From this rocky head the flagstaff on fort Cygogne is a little open to the south of Castel Raet, a rock in the sandy bay on the east side of Penfret, bearing W.N.W.; the western part of the summit of Locrenan mountain on with the eastern slope of Beg-meil high land, N. by W.; and St. Philibert church, N.N.E.; open eastward of the Men Du rock, which dries 15 feet at low water. On other parts of the bank there are from $5\frac{1}{4}$ to 16 fathoms water, rocky bottom.

Pourceaux bank.—Within, and to the northward of the Glenan islands, is the Pourceaux bank, with many rocks appearing above the surface, and others which uncover at low water. The most important of these rocks, on the northern side of the bank, is marked by a tower 8 feet above high water, painted red, surmounted by an iron perch carrying a red spherical vane.

Basse Rouge and other rocks.—To the northward of Pourceaux bank is Ile aux Moutons and bank, on the west extreme of which is Basse Rouge, marked by a stone tower, surmounted by a spherical vane, both of which are painted in red and black bands alternated with white; and the Treusvas, lying northward of the bank, is marked by a tower painted black, surmounted by a spherical

vane ; within these are numerous other rocky patches and shallows ; one of these, called Men Diou rock, is marked by a stone tower, surmounted by an iron perch.

A black spire buoy marks the Basse du Chenal, and a red spire buoy the Basse Malvie.

LIGHTS.—On the north end of Penfret island is a square tower, which exhibits, at an elevation of 118 feet above high water, a *fixed white* light, varied every *four minutes* by a *flash*, visible in clear weather from distances of 21 and 17 miles respectively. The faint light which is perceptible during the intervals is preceded and followed by short eclipses, but these are not total within the distance of 6 miles.

There is but little apparent difference between this light and that on Pilier islet (page 97), but there is no danger of mistaking the one for the other, as it is not possible for any vessel from seaward to arrive in sight of the Penfret light without having previously seen either the *revolving* light on Belle Ile or that on Penmarc'h point ; and when approaching the Chaussée de Sein, there are visible at the same time the *flashing* light on the Ile de Sein, and the *fixed* light on Pointe du Raz.

Isle aux Moutons.—On Isle aux Moutons stands a tower 49 feet high, from which, at an elevation of 56 feet above high water, is exhibited a *fixed* light :—showing *red* through an arc of $55\frac{1}{2}^{\circ}$, between the bearings S. $19\frac{1}{2}^{\circ}$ E. and S. 75° E. (over the dangers included between les Poulains and Karekgrès)* ; *white* through an arc of $57\frac{1}{2}^{\circ}$ from S. 75° E. to N. $47\frac{1}{2}^{\circ}$ E. ; *red* through an arc of 96° , between N. $47\frac{1}{2}^{\circ}$ and N. $48\frac{1}{2}^{\circ}$ W. (covering the dangers between Bluiniers and Basse Jaune shoals ; and *white* between N. $48\frac{1}{2}^{\circ}$ W. and S. $19\frac{1}{2}^{\circ}$ E.

The white light should be visible in clear weather from a distance of 12 miles, and the red 7 miles.

Anchorage.—Off the east and north-east sides of Penfret, where the island is steep-to and free from danger, there is good anchorage in 15 to 18 fathoms water, muddy bottom, at from 1 to $2\frac{1}{2}$ miles distance from the shore. Here vessels will lie well sheltered with winds from S.W. round westerly to N.E., being exposed only to those between East and South, and in that direction the Basse Jaune reduces the force of the sea.

In the winter the safest anchorage is well to the northward, in

* Karekgrès rock is marked on its south-east side by a black buoy.

15 fathoms, nearly two miles from the north end of Penfret, with the flagstaff of fort Cygogne bearing about W.S.W., and the Ile aux Moutons N.W. For watering or other reasons, in order to be nearer Penfret, the flagstaff of fort Cygogne may be brought in line with the north end of Penfret, bearing about W. $\frac{1}{4}$ N., and Ile aux Moutons, N.W. by N.; this position will be about three-quarters of a mile from Penfret in 15 fathoms, muddy bottom, but more exposed to southerly winds.

Tides.—It is high water, full and change, at the Glenan islands at 3h. 12m.; springs rise 13 feet, neaps 10 feet. The eastern or flood stream usually runs an hour longer when it is uninterrupted. The rate of both streams is from half a mile to 2 miles an hour.

Directions.—When bound for the above anchorages from the southward, bring Ile aux Moutons to bear N.N.W. $\frac{1}{2}$ W. and open a little northward of the north point of Penfret, which will lead between the Glenan islands and the Basse Jaune, in from 25 to 15 fathoms water.

There are passages between the Glenan islands and the Pourceaux bank, and between Ile aux Moutons and the main to the westward; but the dangers in them are so numerous that they should not be attempted by strangers unless in cases of necessity, and then the chart and the eye should be the guide.

Roch Helon bank, lying between Ile aux Moutons and the main, is marked near its extreme west end by the red spire buoy, and Rostolon shoal is marked on its south-east side by a black buoy.

PONT L'ABBÉ RIVER.—Anse de Benodet, at about 10 miles eastward of Penmarc'h point, is so studded with dangers, that to a stranger the services of a pilot are indispensable. On the west side of the bay is the entrance to the little river Pont l'Abbé, which is almost barred by banks, and accessible only at high water, through a small navigable channel. When within the entrance the water deepens, and small vessels may anchor near Tudy isle, abreast of Loctudy.

La Perdrix rock, at the entrance of the river, is marked by a stone tower painted red, surmounted by a red spherical vane 10 feet above high water; and the extreme of the spit, which extends nearly half a mile from Kareck-hir point, one mile to the southward of the lighthouse, is marked by a tower painted black, surmounted by a spherical vane 12 feet above high water.

Men Du and Men Bret rocks are also marked by stone towers painted black, surmounted by spherical vanes.

LIGHT.—On the south side of entrance to Pont l'Abbé river is a circular tower showing a *fixed white* light, at an elevation of 35 feet above high water, and seen in clear weather from a distance of 9 miles.

The light shows *red* between the bearings of N. 30° E. and N. 4° W., and from N. 24° W. to N. 45° W.

ODET or QUIMPER RIVER.—At the head of Benodet bay, and $2\frac{1}{4}$ miles eastward of Pont l'Abbé river, is the mouth of the Odet or Quimper river, which is nearly half a mile wide at the entrance; but the navigable channel, with $3\frac{1}{2}$ to $4\frac{1}{4}$ fathoms water, is narrowed considerably by ledges running off on either side, by two rocky banks, named Les Verres and Le Four, each marked by a red beacon, lying in mid-channel, and by another, La Rousse, near the western point, and marked by a black beacon: these latter dangers uncover respectively 11, 6, and 8 feet at low water. There is a battery on the western point, and one on Pointe de Coq, on the east side within the entrance.

One mile within the entrance, on the east bank, is the village of Benodet; and 9 miles farther, following the windings of the river, is the town of Quimper, the capital of the department of Finistère, which possesses a cathedral, and bears the stamp of antiquity as much as any town in Brittany. The manufactures consist of earthenware, leather and beer. There are also building yards. The trade is important, the imports consisting chiefly of coal, timber, wine, and resin; and the exports grain and wine barrels, of which latter there is a large manufacture.

There is railway communication between Quimper and Nantes.

Depth of water.—Vessels of 9 feet draught can ascend the river as far as Quimper at low water, and steam vessels of heavy draught can remain off Benodet, or in the cove of Kerandren; it is requisite, however, to moor head and stern. The navigable channel has from $3\frac{1}{2}$ to $4\frac{1}{4}$ fathoms water.

LIGHTS.—On the east side of entrance to the Odet there are two lighthouses; one on Coq point, half a mile within the entrance, which shows a *fixed red* light, 33 feet above high water, visible 9 miles; and the other, at 368 yards N. 4° E. from it, exhibits a *fixed white* light, 151 feet above high water, visible through an arc of 36°. The two lights in line are the leading marks for the channel into the river.

On Combrit point, west side of entrance to the Odet, is exhibited a *flashing white* light, visible seaward between Le Taro beacon and Le Baril rock, or between the bearings of N. 42° E. and N. 30° W.

Semaphore.—A semaphore stands on the west point of the entrance to the river, but it is not used in times of peace.

Directions.—The best anchorage in Benodet bay, off the entrance of the Odet, is in 5 or 6 fathoms water, with the east side of Penan-Guern rock (at the north-east side of Ile aux Mouton), in line with the lighthouse on Penfret, bearing S.S.E. In steering from this anchorage towards the river, take care to avoid Le Taro, Les Mats, and other dangers about 1½ miles off the eastern shore of the bay. Le Taro, the western of these dangers, uncovers 7 feet at low water; it is marked by a red and white beacon, and lies with Tregune church in line with Moustierlin point, bearing E. by S. ¼ S., and Benodet church on with fort Coq. This latter mark leads westward of the reefs, which extend 2 miles southward of Moustierlin point.

Approaching Odet river entrance by the West channel, Benodet North light kept in line with Combrit point light, bearing N. 18½° E., leads between Basse du Chenal and Basse Malvie, and to the northward, until the northern limit of the sector of *red* light shown from Ile aux Moutons, bearing S. by E. ¾ E., is passed, when the course should be altered to the eastward and the Benodet lights (Benodet North and Coq point lights) brought in line which lead into the river in mid-channel between the Verres and Four rocks on the east, and La Rousse on the west; the least depth will be about 20 feet. A black buoy lies on the east side of La Rousse. Continue with this mark on until well up to Coq point, when keep in mid-channel, and anchor abreast the village of Benodet in 5 to 7 fathoms water, sand and mud. Strangers are recommended to take a pilot in the bay, before entering the river.

BAIE de la FOREST.—About 6 miles eastward of the entrance to the Odet is the Baie de la Forest, the coast between being bordered with rocks and shoals, many of which appear at low tide, the plateau la Voleuse being marked near its south end by a red spire buoy. The entrance, 2½ miles wide, is between Beg Meil point on the west and Cabellou on the east, and on each point there is a fort.

A rocky ledge extends nearly a mile from Beg Meil, at the extreme of which is Linnen rock, marked by a stone tower, painted black,

surmounted by an iron perch carrying a black spherical vane ; and there are dangerous ledges off Cabellou point.

The bay is also studded with dangers, but, with local knowledge, anchorage may be obtained in 5 to 6 fathoms, mud bottom.

Concarneau.—On the eastern side of Forest bay is the little harbour of Concarneau, which has good anchorage, but is suitable only for small vessels, the entrance being obstructed by rocks, and it should not be attempted without a pilot. It is open to the south, and is sheltered to the westward by the promontory upon which the new town is built. The old town, which stands on a small island in the middle of the harbour, is surrounded by thick stone walls, with a projecting parapet, and towers at regular distances. The suburbs are more extensive than the town, and are better built. The island is 400 yards long and 120 broad. The boats belonging to the place are engaged in the pilchard fishery. Besides pilchards and other fish, the exports are cider, wood, and grain ; the imports, salt, wine, spirits, and Norway deals.

Depth of water.—Most of the dangers at the entrance of Concarneau dry from one to 16 feet at low water, but there are others with only 2 to 5 feet over them at that time of tide. The south-east extremity of the plateau of Luè-Vras, and the Basse du Chenal are marked by black buoys.

The Men Cren is a rock, with a beacon on it, lying on the west side of the channel into the harbour ; it never covers, and eastward of it is an outer anchorage in 5 to 6½ fathoms, sand, mud, and shells. From this to the town the depths are from 20 to 11 feet at low water.*

There are two pyramids on the eastern side of the harbour, the northern one of which serves to mark the channel shoal (Basse du Chenal).

The prevailing winds are those from N.W. to S.W., and gales are most common from the West and S.W.

LIGHTS.—There are three lights at Concarneau—two as a leading mark for the entrance channel, and one to guide to the anchorage. The first is a *fixed white* light exhibited from a circular turret in the Croix fort, on west side of entrance ; it is elevated 46 feet above high water, and visible 9 miles.

At about a mile N.E. ½ E. from the above is another turret, which also shows a *fixed white* light, elevated 177 feet, and visible 14 miles.

* Kersos rock, at the north extremity of St. Anne rocks, is marked by a red beacon surmounted by a ball.

These lights in line lead in through the channel between the Men Cren and Men Fall shoal, which latter is marked by a red buoy.

The other is a *fixed red* light shown from a house at Lanriec, on the eastern shore ; it is elevated 43 feet above high water, visible 9 miles, and is intended to guide vessels to the anchorage after passing the Men Fall shoal. It only lights an area of 19° free from danger, and the southern limit of the light passes about 90 yards northward of the Men Fall ; it will also be lost sight of before the vessel reaches the shore where it is shown.

Medée rock.—*Lighthouse building.*

Tides.—It is high water, full and change, at Concarneau at 3h. 12m. ; springs rise 13 feet, neaps 9½ feet. In the channel, between the island and the coast of Lanriec, the currents are at times somewhat rapid.

Directions.—When bound to Concarneau harbour from the southward, after passing on either side of the Basse Jaune, keep the lead going and preserve the depth of 15 to 16 fathoms, to avoid the dangers off Trévignon point, for they are steep-to and most of them covered, except at low water, when the Flaharn and others show. Some of the Soldats are uncovered. The general nature of the bottom will be green mud and clay, and the soundings will decrease to 12 and 11 fathoms, as the leading mark for the entrance is approached.

Beuzec church in line with Concarneau church leads in the deepest water through the channel between the Luë-vras rocks, and Men Cren on the west side, and the Men Fall, Barzic, and Cochon rocks on the east. When close up to the Men Cren, steer for the windmill on the eastern shore, passing at least 1½ cables southwards of the west point of entrance of the harbour to avoid the shallow ground around it, and steer in along by the eastern shore.

At night keep the two *white* lights in line, bearing N.E. ½ E., until the Men Fall is passed, when steer towards the *red* light, and anchor in the outer road.

The coast from Cabellou point trends in a S. by E. direction, 5 miles to Trévignon point, on which is a fort and signal house with a semaphore. One and a half miles from the former point is Jument point, with rocky ledges extending from it, and from half to about 1½ miles off the point is an extensive flat, having shoal patches with 2 to 18 feet on them at low water ; the outermost, named Le Corven, has 16 feet on it, and between this flat and the shore are several very shoal spots.

Hence to Trévignon point the coast is bordered with rocky patches, the outermost of which, with only 7 feet on it, and named Le Corven de Trévignon, lies nearly $1\frac{1}{2}$ miles from the point, with St. Philibert church bearing E. by N. Six cables N.E. by N. $\frac{1}{2}$ N. of this patch is the Flaharn, which dries 5 feet, and to the northward, $3\frac{1}{2}$ cables from the Flaharn, are Les Soldats, of which some are uncovered.

From Trévignon point the coast trends easterly for 5 miles to the entrance of the little rivers Aven and Bélon, both of which are shallow and have bars that dry one foot at the lowest tides; the former has a lighthouse on the western point of its entrance. About midway between Trévignon point and these rivers, and a mile off shore, is a small islet, named Ile Verte or Green isle, and within this is Raguénès islet. There are several shoal patches outside Verte isle, the Men an Tréas, one mile west of it, uncovers 4 feet at low springs, a near approach to the shore is therefore dangerous.

The Corn-Vas, the western extreme of the Men an Tréas, is marked on its south-west side by a small red buoy.

Before the entrances to the rivers are Le Cochon and Les Verrés ledges, which dry 2 to 8 feet, the latter is marked by a beacon, and Le Trépied bank with $3\frac{1}{4}$ fathoms over it at low water; these must be left to the eastward when steering for the river entrances, off which the depths are from 2 to 3 fathoms.

Two and a half miles S.E. $\frac{1}{2}$ S. from the entrances of Aven and Bélon rivers is Beg Morg point, close to which are Les Cochons rocks awash at low tide. Immediately eastward of this point is a small inlet, named port de Brigneau, with rocks at either side of its entrance; and three-quarters of a mile farther is port de Méryen, the entrance to which is also rocky. On the shore, one mile eastward of Méryen, is a semaphore station, and half a mile farther is port de Douélan creek.

Semaphore.—There is a semaphore on Beg Morg point.

Four rock, at the entrance of Douélan harbour, is marked by a tower 7 feet above high water, painted in alternate red and white bands, and surmounted by a mast.

LIGHTS.—On Bec-ar-Vechen point, at the western side of the entrance of the river Aven, is a stone turret which exhibits a *fixed* light, showing *white* between E. by N. $\frac{3}{4}$ N., and N. by W. $\frac{1}{4}$ W.; *red* covering Les Verrés rocks; *white* between N. 26° W. and N. 37° W.; and *green* when approaching the coast to the eastward. The light is elevated 125 feet above high-water level; the *white* and the *red* light are visible 9 miles, and the *green* light 5 miles.

Port de Douélan.—Two *fixed white* lights are exhibited from round turrets at the entrance to port de Douélan 365 yards apart, bearing N. $\frac{3}{4}$ E. and S. $\frac{3}{4}$ W. of each other, and both visible at a distance of 9 miles. The two lights in line lead into port.*

QUIMPERLÉ RIVER.—The entrance to this river, 3 miles eastward of port de Douélan, is narrow and barred, but vessels of 150 tons burthen ascend to the town of Quimperlé (about $6\frac{1}{2}$ miles from the entrance), which has a considerable trade. Close off the entrance of the Quimperlé are some rocks marked by beacons, which dry 4 feet at low water.

The coast from Quimperlé river trends to the southward for 2 miles to fort Kergan standing on a rock close to the shore, forming Pouldu bay, in which the soundings decrease gradually to the shore. Thence the coast for $3\frac{1}{4}$ miles, to Talut point, is bordered by rocky patches, many of which are dry at low water, extending at least $1\frac{1}{4}$ miles from the shore. From Talut point the shore tends round to the eastward for 3 miles to the entrance of port Louis, and is skirted all the way by rocks.†

L'ILE de GROIX lies 18 miles S.E. by E. of the Glenan islands, and between it and the main land, from which it is distant 3 miles, is a good channel with 14 to 19 fathoms water in it, leading to port Louis and L'Orient. The island, which may be distinguished by a lighthouse at each end, is $4\frac{1}{4}$ miles long N.W. $\frac{1}{2}$ W. and S.E. $\frac{1}{2}$ E., and $1\frac{1}{2}$ miles broad. The population is mostly seafaring, and their chief occupation is fishing.

The coasts of this island are free from danger, excepting near the north-east and south-east sides, particularly the latter, off which dangers extend nearly $1\frac{1}{4}$ miles. Three-quarters of a mile north-west from the lighthouse on the eastern part of the island, and about a third of a mile from the shore, are rocks and shallow patches named Basses Milit (marked by a black buoy), which are steep-to, and therefore dangerous to approach. From Pointe des Chats, the south-east extreme of the island, a reef extends three-quarters of a mile to the southward, terminating in the rocks named Les Chats, which are occasionally uncovered.

* Two buoys are moored in the entrance of Douélan harbour, for the convenience of vessels getting under weigh.

An iron beacon, surmounted by an oval-shaped vane, marks the Basse Lacroix, situated south-west of Port de Douélan, near point Beg-an-tour.

† Le Roliou rock, entrance to Stole bay, westward of Lorient, is marked by two beacons painted black and surmounted by vanes. The north beacon vane is about 10 feet high, and the south beacon vane 13 feet.

Nearly $1\frac{1}{2}$ miles S. by E. from this point is the Basses des Chats, over which there are only 12 feet water, and marked on its south-east side by a black automatic whistle buoy. The marks for it are, Enfer and St. Nicolas points on the south side of Ile de Groix in line bearing N.W. $\frac{1}{4}$ N., and the tower of port L'Orient in line with the citadel of port Louis N.N.E. $\frac{1}{4}$ E. L'Orient church tower in line with Le Peyriere lighthouse, bearing N.N.E. $\frac{1}{2}$ E. leads close to the eastward of the buoy. There is also a small patch, with 4 fathoms water over it, to the north-west of this shoal, but between it and the Chats rocks there is deep water.

This island is bordered on the north side by the Basse des Bretons, with depths of 6 to 15 fathoms, sand, mud, and gravel, which extends nearly half way over from the island towards the main.

LIGHTS.—There are two lighthouses on Ile de Groix; one standing S. by E. $\frac{1}{2}$ E., about a quarter of a mile within Pen Men point, the north-west extreme of the island, the other in fort de la Croix, at the eastern extreme.

Pen Men point.—The lighthouse of Pen Men point has a square tower which exhibits, at an elevation of 194 feet above high water, a *fixed white* light, visible in clear weather from a distance of 20 miles.

Fort de la Croix.—The lighthouse in fort de la Croix exhibits a *fixed white* light, varied every *three minutes* by a *red flash*. The light is elevated 171 feet, and visible 11 miles, except towards the Glenan islands, in which direction it is masked by the heights of the western part of Groix.

It should be remarked that, except in foggy weather, vessels coming from the southward will perceive the light on Belle Ile, which *revolves* every minute, before the light on Pen Men point can be seen; and that in approaching Ile de Groix, the *flashing* light on its eastern point will be seen shortly after the light on Pen Men point. In like manner, vessels coming from the westward will not be exposed to the risk of mistaking the lights; for, before the light on Pen Men point will be visible they will almost always have seen Penmarc'h point light which *revolves* every half minute, and also Penfret island *fixed* and *flashing* light, both of which have been described in pages 55 and 58.

Semaphore.—There is a semaphore on Bec Melen point, situated about 760 yards to the westward of Grognon point, on the north side of the island, where the semaphore was formerly worked.

Life boat.—A life boat is stationed at L'ile de Groix.

CHAPTER III.

ILE DE GROIX TO FUENTERRABIA.

VARIATION in 1891.

Ile de Groix	-	-	17° 30' W.	Ile d'Oleron	-	-	16° 15' W.
Gironde river, entrance	16° 15' W.	|	Adour river, entrance	16° 0' W.			

PORTS LOUIS and L'ORIENT.—4 miles N.E. by E. from the lighthouse on the eastern end of Ile de Groix is Pointe de Gavre, the south extreme of a peninsula on the east side of entrance to the harbours of ports Louis and L'Orient. On the eastern shore, about $1\frac{1}{2}$ miles within Ponte de Gavre, is the strongly fortified town of port Louis, and about 2 miles northward of the latter is the town of L'Orient, on the right bank of the river Pont Scorf, a small stream which unites at half a mile below the town with the river Blavet, from the eastward, and they both fall into the northern part of the harbour of port Louis.*

L'Orient is one of the five naval ports of France. The arsenal is large and commodious, and has accommodation on the building slips for the simultaneous construction of several vessels of war. There are also factories for steel ship building. A school of gunnery is established on Pointe de Gavre, where experiments are constantly carried on.

The chief exports are rye, potatoes, and sundries, of the value in 1889 of £21,918. The chief imports are coal, building timber, oil, wine, wheat, and sundries; of the value in 1889 of £155,216. The total number of vessels of all nationalities that entered the port in 1889 was 82, representing an aggregate tonnage of 14,425 tons.

There is steam communication to Bordeaux, Bayonne, Havre, Dunkirk, and Belgium, and railway communication to all parts of Europe.†

There is telegraphic communication to all parts of the world.

There are no special Custom-house or quarantine regulations, and no diseases against which special precautions are necessary.

* See Admiralty charts :—Port Louis and L'Orient, No. 804; scale, $m=5\cdot0$ inches, also France, west coast, sheet 5, Bourgneuf to Ile de Groix, with views, No. 2,646, scale, $m=0\cdot5$ an inch; also Bay of Biscay, No. 1,104, scale, $m=0\cdot07$ inches.

† From information furnished by H.B.M. Vice-Consul, 1887 and 1890.

Sailors are received at a civil hospital. There are no homes for sailors.

The population in 1886 was 40,055. Supplies for merchant ships can always be obtained.

The entrance to the harbours is bounded on the east by the rocks lying off the peninsula of Le Gavre, on the south by the Bastresses, Errants, and Truies rocks, and on the west by the ledges extending from that shore. The channel gradually narrows, and between the Jument rock and the citadel of port Louis it is not more than 150 yards wide at low water, immediately within which is the harbour of port Louis, occupying a space of nearly 2 miles in length, in a north-east and south-west direction, and an average breadth of half a mile; but the depths are irregular, and the anchorage much contracted by banks and shoal patches. In the centre of the harbour is Ile St. Michel, which is covered with the yellow building of the Lazaret. A vessel may pass on either side of this islet in proceeding towards L'Orient, but the western channel is the deeper; and, if it be necessary to wait for the tide, there is anchorage in 6 or 7 fathoms water, in the southern part of the harbour.

The port of L'Orient is abreast the town of the same name, and is occupied only by vessels of war. It is about three-quarters of a mile in extent, north and south, but not more than a cable wide at low water. Half a mile above the port is a suspension bridge, near which are more establishments belonging to the arsenal. On the south side of the town is a narrow creek, dry at low water, leading to the commercial port, which is 760 yards long, and communicates with a basin about 400 yards long.

Navigability.—A vessel drawing 28 feet can navigate the channel to the port at high water neaps, and a vessel of 16½ feet draught can do so at low water springs. An ironclad drawing nearly 29 feet has visited the port.

Docks.—There are two Government dry docks and a slip. No. 1 dock is 380½ feet over all, 56½ feet breadth of entrance.

No. 2 dock is 512¼ feet over all, 87¼ feet breadth of entrance.

There is a slip 258 feet long and 52 feet wide.

The Commercial wet dock is about 1,200 feet long and 230 feet wide, and 52½ width of entrance, with about 18¾ feet depth of water over the sill at high water spring tides. The length of quays is 2,434 feet. A vessel of 1,300 tons and drawing 16 feet has been admitted to this dock.*

* A steam crane at the new wharf is contemplated.

Vessels up to 600 tons burthen can be repaired in the commercial dock, and larger vessels at the government dry docks.

Coal.—There are generally 1,000 tons of coal kept in stock, the price being about 21 shillings a ton.

Steamers, drawing up to 15 feet, can be coaled in the wet dock, and above that draught of water, in the roads.

Time ball.—At the mast of the Harbour tower, a black ball is hoisted close up at 5 minutes before signal, and dropped at 10h. 0m., Os. a.m., Paris mean time, corresponding to 21h. 50m. 39s., Greenwich mean time. Signal is repeated after an interval of 2 minutes.

LIGHTS.—On the hill of La Peyrière, at the north-west side of port Louis and about a third of a mile north of Ile St. Michel, is a square turret, which shows, at 75 feet above high water, a *fixed white* light, visible in clear weather 14 miles. At the distance of nearly a mile N.N.E. $\frac{1}{2}$ E. from the above light-tower another *fixed white* light is exhibited from L'Orient church tower, at 148 feet above high water, visible 14 miles. These lights in line lead through the eastern channel or Passe de Gavre.

On the end of the breakwater, a *fixed red* light is exhibited, visible 5 miles. There is also a *fixed white* light, visible 6 miles, at the landing place.

On the south bastion of the fortifications of port Louis a *fixed white* light is shown from a small house, at 20 feet above high water, visible at the distance of 9 miles. At Kerbel, E. by N., distant about a mile from this light, is a circular turret which exhibits another *fixed white* light, at 62 feet above high water, and visible 13 miles. These two latter lights in line lead in through the Great channel, and they are only visible through an arc of 18° on each side of the centre of the channel.

There is a *fixed red* light at the extremity of port Louis jetty, visible 4 miles.

At Keroman creek two leading lights are exhibited.

The high light is a *fixed red* light, shown from the keeper's dwelling, elevated 45 feet above high water, and should be visible in clear weather from a distance of 13 miles.

The low light is a *fixed green* light, shown from a post situated 372 yards from the high light; it is elevated 10 feet above high water, and should be visible in clear weather from a distance of 9 miles.

These lights in line, bearing N. by E. $\frac{1}{4}$ E., lead between Turc bank and the shoal ground extending from the western shore, and are only visible through an arc of about 16° .

In Kernevel bay two leading lights are exhibited.

The high light is a *fixed red* light, shown from the keeper's dwelling, elevated 30 feet above high water, and should be visible in clear weather from a distance of 8 miles.

The low light is a *fixed green* light, shown from a post 328 yards from the high light; it is elevated 5 feet above high water, and should be visible in clear weather from a distance of 9 miles.

The Kernevel lights in line, bearing S.W. by W., indicate the channel from their intersection with the line of Keroman leading lights, to the anchorage of Penmane.

These leading lights are only visible through an arc of about 16° .

Tides.—It is high water, full and change, at port Louis at 3h. 11m; ordinary springs rise 13 feet, neaps $9\frac{1}{2}$ feet.

Directions.—The Great or western channel into port Louis is between Les Truies bank and rocks on the east, and Basse de la Paille and Basse du Chenal on the west; the Paille has 3 feet least water over it, the Chenal 11 feet, and the Truies bank 10 feet; one of the Truies rocks is always above water, and has a red beacon on it, the others uncover 2 to 12 feet at low water.

The eastern channel is between Les Bastresses on the east and Les Errants rocks on the west; the former is a bank with numerous shallow heads on it, one of which, Le Baril Rond, is awash at low water; on the north-west side of Bastresses rocks is a red buoy, with staff and vane, and marked Bastresses Nord; the southern buoy is also a red buoy and marked Bastresses Sud. Les Errants are never completely covered, and a statue marks the eastern rock. A pear-shaped buoy, painted black, marks the end of the 9 feet bank, which extends eastward from Les Errants. The least depth in either channel with the leading marks on is 16 feet at low water; but the eastern channel is narrow, and should not be attempted without a pilot.

Approaching by the western channel, steer midway between Ile de Groix and the coast, until the lighthouse at Kerbel is in line with the one in the south bastion of the fortifications of port Louis bearing E. by N.—or at night the two lights in line,—which leads between the dangers on either side. (*See view A., chart No. 304*). A black buoy, with a vane, marks the shoal water north of Les Trois Pierres. Continue with these marks on until L'Orient church is in line with the lighthouse at La Peyrière. Then steer N.N.E. $\frac{1}{2}$ E.—or at night the lights in line—(*See view B., chart No. 304*)—and with

this mark kept exactly on a vessel will pass westward of La Paix rock and Potée de Beurre rocks, on both of which there is a red beacon, and mid-channel between the Jument rock, marked with a black beacon, and the foot of the citadel of port Louis. La Paix rock is also marked by a red buoy, on its western side, in 3 fathoms. Having passed the citadel, if the vessel is of large draught and bound to L'Orient, anchor in 6 or 7 fathoms, taking care to avoid Kernevel shoal, the 3 fathoms patch which lies nearly midway between Cochon rock and Kerso bank, and wait for high water.

The leading mark through the eastern channel between the Errants and Bastresses, is L'Orient church tower in line with the lighthouse at La Peyrière, bearing N.N.E. $\frac{1}{2}$ E.—or at night the lights in line—but this mark must be kept exactly on, as it leads close to some of the dangers, which are buoyed.* There is also a narrow channel used by coasters between Pointe de Gavre and Les Bastresses.

Vessels entering port L'Orient at night, and proceeding to the inner harbour, should keep the fixed white lights of L'Orient church lower and La Peyrière in line until Keroman leading lights come in line, when those lights should be steered for until Kernevel lights appear in line astern for leading to the anchorage of Penmane. The fixed white light of the landing place at L'Orient is also a guide to the anchorage at Penmane.

THE COAST from Pointe de Gavre trends to the southward for about 13 miles to Beg en Aud, the north extreme of the Presqu'île de Quiberon. The land between is generally low, with downs, and the shore—which forms a bend to the north-east—a sandy beach, and as in places several dangers lie a considerable distance off, it should be approached with caution.

Basse de Gavre.—The first danger south-eastward of Pointe de Gavre, is a shallow patch having $2\frac{1}{2}$ fathoms over it at low water, with a reef of rocks to the northward; and three-quarters of a mile southward of the point lies a rocky patch of 16 feet, and steep-to, named Basse de Gavre.

Magoëro rocks.—About 4 miles south-eastward of Pointe de Gavre, and a long half mile from the shore, are the Magoëro rocks, which uncover 18 feet at low water. On the land abreast this ledge is a semaphore.

* An iron beacon surmounted by a can painted red, about 9 feet high, has been placed on Pesqueresse rock, at the entrance to, and on the south side of the channel leading to Locmalo bay.

Etel river.—Two miles south-east of the Magoëro rocks, is the Rivière d'Etel, a small stream, the entrance to which is obstructed by a bar with only 2 feet over it, but the water deepens to 20 and 25 feet within.*

Roheu rocks.—About $1\frac{1}{2}$ miles W. by N. $\frac{1}{4}$ N. of the entrance are the two Roheu rocks, which uncover 17 and 19 feet at low water, the southern rock being marked by a tower.

Rohellan rock.—Pointe d'Ardevenne, $1\frac{1}{2}$ miles south-east of the entrance, is bordered by a rocky ledge, and southward of it are several rocks, the principal of which the Rohellan, is always uncovered.

Les Pierres Noires.—About 2 miles S.W. of Ardevenne Point, is the centre of a rocky bank, which is a mile in length east and west, with general depths of 4 to 6 fathoms over it, but there are several patches of 3 to 15 feet water, and on its western part are some heads which uncover 10 feet. From these latter, which are named Les Pierres Noires or Chivignete rocks, the largest one being marked by a tower, the church of Ardevenne is in line with the Rohellan rock, bearing N.E. by E. $\frac{1}{2}$ E., and the Men Toul rock is in line with the south part of Penthievre fort, S.S.E. $\frac{3}{4}$ E. nearly. The soundings around the bank are 7 to 11 fathoms, gray sand, and rocky bottom.

The Shore.—From Ardevenne point continues low until near the north end of the peninsula of Quiberon, when it rises a little and becomes bolder. On the narrow neck of the isthmus connecting the peninsula with the main land, is fort Penthievre, abreast of which is Ile Teviec, surrounded by numerous rocks which extend fully 3 miles northward of Beg en Aud, and 2 miles from the shore, so that a vessel should not approach this part of the coast too near.

The peninsula of Quiberon, 5 miles long north and south, and about $1\frac{1}{4}$ miles wide, is high, and the western shore is bold and cliffy, but off its southern end are numerous rocks, many of which are covered at low water. The semaphore of Loc Maria, near the south end of the peninsula, is surmounted by a watch tower, which can be seen in all directions.

La Teignouse is $1\frac{1}{2}$ miles S.E. $\frac{1}{4}$ S. from the south-east extreme of the peninsula; it is large, high, round, and distinguished by a lighthouse. Within the lighthouse there is no passage, being all foul

* Pen Men rock at the entrance of the river Etel, is marked by a small stone tower, which should be left to port on entering by the west channel.

ground, but south of the Basse du Chenal and the lighthouse, between them and the Chaussée du Beniguet, is the Passage de la Teignouse, which is frequently used.

The Basse Cariou and Basse du Chenal, the southernmost of the dangers extending from the peninsula, are marked by black buoys. The Goué-Vas and the Basse Nouvelle, are also marked by buoys.

LIGHTS.—The river Etel is distinguished at night by a *fixed red* light, which is exhibited from a tower on the west side of entrance, at an elevation of 40 feet above high water, and visible in clear weather 6 miles.

A life boat is stationed at Etel river.

Teignouse rock.—The lighthouse on the Teignouse rock, shows at an elevation of 59 feet above high water, a *white* light varied by a *flash* every *three minutes*, visible 13 miles.

Fog bell.—During thick or foggy weather a bell is sounded at intervals of two seconds. (*See* fog signals, p. 2.)

PLATEAU des BIRVIDEAUX.—This rocky bank, about $5\frac{1}{2}$ miles westward of Beg en Aud, is one mile long east and west, with general depths over it of 4 to 7 fathoms; but near the centre of the bank are shoal patches with 8 to 21 feet water on them. From the 8 feet patch, Portivi windmill is seen a little to the right of a small white house standing on the north point of the entrance to Portz Guen bay, and Borderun semaphore, on Belle Ile, in one with the guard-house of the battery on Vieux Chateau point, S. $\frac{1}{2}$ W. A black buoy, marked Birvideaux Nord, is moored a short distance from the north extreme of the plateau.*

BELLE ILE, $9\frac{1}{4}$ miles long N.W. by N. and S.E. by S., and 5 miles wide at its broadest part, affords shelter during west and south-west winds. Its shores are generally high and steep, and its natural strength is much augmented by fortifications on its accessible parts. Near the middle of its north-east side is Le Palais, the chief town, defended by a citadel, the walls of which bound the northern side of a small artificial harbour with only 5 feet at high water.†

* An experimental red buoy with a white band, is moored about 500 yards from the south side of the Plateau. *See* Paris Notice to Mariners No. 185, 1888, also report of H. B. M. Consul, Brest, January 1889.

† Two buoys mark the extremity of the moles under construction at Palais harbour, the buoy at the northern mole is red; that at the southern mole is black, and the passage to the harbour is between them. 1884.

On the north side of the island, 3 miles north-west of Le Palais, is port Sauzon, which is said to be capable of receiving vessels of 50 tons, but they lie aground at low water. A black tower stands on the point of Port Blanc, at the entrance of the harbour. This harbour is easy of access, and considered preferable to that of Le Palais, although the latter is the more frequented. The island is well cultivated, and produces excellent wheat; fresh water is abundant.

Several rocks and shallow heads lie along the shores of Belle Ile, but none of them are farther off than three-quarters of a mile. Vessels, however, bound round the north-west point of the island must give it a berth of at least $1\frac{1}{2}$ miles to avoid Les Poulains reef, which extends nearly that distance in a N.W. by W. direction from the point. Some of the rocks on this reef uncover at low water, whilst others have only 6 to 8 feet on them at that time of tide.

Depth of water.—The general soundings in the channel on the north-east side of the island are from 8 to 15 fathoms, excepting on the Bancs de Taillefer, which are three distinct ridges lying parallel to each other in mid-channel. They have from 6 to 8 fathoms water on them, but on the centre ridge is a shoal spot with only 21 feet on it, from which the citadel of Le Palais bears S.W. $\frac{1}{4}$ W., distant $2\frac{3}{4}$ miles. Other shoal patches lie to the southward of these ridges, but none have less than 10 fathoms over them, except a rocky patch of $4\frac{1}{2}$ fathoms, named Basse du Palais, lying E.S.E. $1\frac{1}{2}$ miles from the citadel.

Dock.—There is a wet dock at Le Palais, 1,148 feet long, average width 102 feet, and width of entrance $32\frac{1}{2}$ feet, with about 21 feet over the sill at high water ordinary spring tides.

Semaphores.—There are several semaphores on Belle Ile, and communication with the main land by electric telegraph. Vessels by using the commercial code of signals can transmit messages to any of the provincial towns in Europe.

LIGHTS.—There are five lighthouses on Belle Ile; one on the table land above port Goulfar, near the middle of the south-west side of the island; another on Ile aux Poulains, near Pointe de Poulains (the north point of the island); a third on the mole-head on the west side of entrance to port Sauzon; the fourth on the mole-head on south side of entrance to port Le Palais; and the fifth near Kerdonis point, the east extreme of Belle Ile.

Port Goulfar light-tower exhibits, at 276 feet above high water, an *electric group flashing white* light, showing *every ten seconds* a group of two flashes separated by an eclipse of nearly *two seconds* duration, the intervals between the groups being about *seven seconds*, and should be visible in clear weather from a distance of 23 miles.

Île aux Poulains.—The light tower on Île aux Poulains, at the north extreme of the island, exhibits a white light *occulting* at intervals of *five seconds*, elevated 114 feet above high water, and visible in clear weather at a distance of 16 miles. This light when in line with port Goulfar *revolving* light, leads over the centre part (nearly) of the Plateau des Bervideaux.

Le Palais and Sauzon.—The tower at Le Palais shows, at an elevation of 30 feet above high water, a *fixed white* light, visible 9 miles. That at Sauzon shows at the same elevation a *fixed red* light, visible 5 miles.*

Kerdonis point light exhibits alternately a *fixed white* light of *twenty-five seconds* duration, and *five red flashes* during the following *twenty-five seconds*; it is elevated 115 feet above high water, and should be visible in clear weather from a distance of 12 miles.

CAUTION.—When approaching from the southward or westward, in order that the revolving light on the south-west side of Belle Île may not be mistaken for the revolving light on the Plateau du Four, at about 25 miles eastward, it must be remembered,—that the Belle Île light is much more brilliant than the Four light, that it revolves only *once* in a minute, that it is 197 feet higher than the Four light, and that on approaching the former the high land of the island can generally be distinguished at night.

Tides.—It is high water, full and change, at Le Palais at 3h. 38m.; springs rise 16 $\frac{1}{4}$ feet, neaps 12 $\frac{3}{4}$ feet.

Anchorage.—There are several anchorages along the shores of Belle Île, but those principally used by small vessels in south-west and westerly winds, are on the north-eastern shore, under the citadel of La Palais, and about 3 miles eastward of the citadel; during north-west winds they find shelter on the eastern side of the island, under Kerdonis point. Large vessels will be well sheltered from south-west winds by anchoring in from 8 to 15 fathoms, sand, mud, and shells,

* Pending the completion of the harbour works, a *red* light, elevated 59 feet above high water, is shown at the distance of 116 yards from the mole light, and which in line indicate the harbour entrance. December 1886.

on the north-east side of the island, anywhere between Kerdonis point and Sauzon. The only precaution to be taken is to keep about a mile off shore and to avoid the Basse du Palais.

QUIBERON BAY is about 9 miles wide at the entrance between Les Grands Cardinaux and Pointe de St. Jacques, and affords capacious anchorage in 6 to 10 fathoms, mud, sand, and shells. It is protected on the west by the Quiberon peninsula, and on the south-west and south by groups of islands and rocks named Beniguet, Houat, and Haedik, which extend in a S.S.E. $\frac{1}{2}$ E. direction for 14 miles from the south-east extreme of the peninsula, terminating in high rocks named Les Grands Cardinaux.

The northern shore of the bay is indented by numerous small inlets, some of which dry at low tide, and is fronted by banks and rocks. In the north-east part of the bay is the entrance of the Morbihan, which is so called from two Celtic words, meaning inland, sea. Its shores on all sides have a most broken and jagged outline, and it is for the most part occupied by numerous islands and shoals between which are narrow channels leading up to Vannes and Auray but local pilots are necessary for their navigation.

Several sunken dangers have been found in Quiberon bay, for the position of which the mariner is referred to the chart; caution should be used in navigating this bay, as it is probable that others may exist.

Water.—Excellent water can be obtained from Haedik, the south-west island of the bay.

The town of Vannes (signifying handsome) stands at the head of an inlet in the northern part of the Morbihan. It has two suburbs, Manche and St. Paterne, each larger in extent than the town. The harbour is small, and bordered with quays capable of admitting vessels of small tonnage. The trade is chiefly in corn, salt, hemp, butter, wax, honey, iron, cider, brandy, and wines; and the industrial products are coarse woollen cloth, linen, calico, lace, ironmongery, leather, beer and salt.

The river Auray flows into the western part of the Morbihan near its entrance. Small vessels can ascend it at high water as far as the town of Auray, which stands about 7 miles from the entrance. The inhabitants are employed in the coasting trade and fisheries.

Passage de la Teignouse, formed between the rocks off the south extreme of Quiberon peninsula, the southernmost of which are

marked by black buoys, and the *Chaussée du Beniguet*, is nearly $1\frac{1}{2}$ miles wide ; but nearly in the middle of the western entrance is the *Goué-Vas*, a shoal about half a mile in extent, upon which there are patches of only 4 to 9 feet water ; it is marked by a red buoy on its northern and a black buoy on its southern edge. The *Vieille*, *Fourchec*, and *Sœur* rocks in line, bearing S.E. $\frac{1}{2}$ E., is the cross mark for the 4 feet ; and from a patch of 17 feet on the south-east extreme of the shoal, *Le Petit Mont* in the north-east part of Quiberon bay is open a quarter of a point south-east of *La Teignouse* lighthouse, bearing E. by N. $\frac{3}{4}$ N. *Les Sœurs* is marked by a red tower surmounted by a beacon.

The soundings around the *Goué-Vas* are 6 to 11 fathoms, but to the southward between it and the *Beniguet* are patches of $4\frac{1}{2}$ fathoms, named the *Basse du Milieu*, which narrows the deep water channel south of it to about half a mile. The channel north of *Goué-Vas* is about one-third of a mile wide, and has a depth of 6 fathoms ; being buoyed it will be found preferable. To the eastward of the before-mentioned banks the soundings deepen to 14 and 18 fathoms, the passage widens to a mile, and is clear of danger, excepting a small patch with 6 feet water on it, named *Basse Nouvelle*, marked by a buoy, which lies a third of a mile from *La Teignouse* lighthouse, and in line with *Loc Maria* church, bearing N.W. $\frac{1}{4}$ N.

Tides.—The tides set E.N.E. and W.S.W. through the passage, and at springs the rate is 2 to $2\frac{1}{2}$ miles an hour.

Chaussée du Beniguet is a cluster of islets, rocks, and shallow heads, on a bank of about $2\frac{1}{2}$ miles in extent S.S.E and N.N.W., and a mile wide. Near the north end of the bank are *Les Esclassiers* rocks, from which the *Vieille*, *Fourchec*, and *Sœurs* rocks are in line, bearing S.E. $\frac{1}{2}$ E., and fort *Penthièvre* is a quarter of a point open eastward of fort *Riberen*, on Quiberon peninsula, about N. $\frac{1}{2}$ W. The *Esclassiers*, which are marked by two towers, one red and the other black, dry from 5 to 15 feet at low water, and near them are patches with $1\frac{1}{4}$ to 3 fathoms on them. The black tower in line with *Kerdonis* lighthouse, *Belle Isle*, leads between *Teignouse* and *Basse Nouvelle*.

Houat island, separated from the latter group by the *Passage du Beniguet*, is $2\frac{1}{4}$ miles long, of an irregular shape, and surrounded by rocks and shallow heads, particularly off its southern end, where, lying parallel with the island, is an extensive rocky flat, named *Chaussée de Chevaux*, on which is a small islet. Many of the rocks on this flat uncover others have but little water on them at low tide,

and some are marked by beacons. From a patch of $2\frac{1}{2}$ fathoms, named Basse Occidentale, at the north-west extreme of the flat, the north point of Chevaux isle is in line with the south point of Haedik island, bearing S.E. $\frac{1}{4}$ E.; and the Rouleau rock, off the west end of Houat, is just open westward of the Men er Broc rock, N.E. $\frac{1}{4}$ E. The Banc de Houat, with 2 to 4 fathoms water on it, extends $2\frac{1}{2}$ miles in an E.S.E. direction from the east end of Houat, and bounds the northern side of Haedik road. On Er Spernec bihan, south side of Banc de Houat, stands a beacon tower, painted black; and there is a black and red tower on Men Groise rock.

Rock.—A rock with 7 feet over it, upon which the French corvette *l'Euménide* struck, lies half a mile N.E. from the centre of Houat island.

Passage du Beniguet is not more than 2 cables wide, with 10 and 12 fathoms water in mid-channel, and 7 fathoms near the rocks, which bound the passage on either side, but in the north-east entrance is a small patch of $3\frac{1}{2}$ fathoms, with 8 and 9 fathoms close to. The tide sets directly through, about E. by N. and W. by S., with greater strength than it does in the Teignouse passage. In December 1795 H.M.S. *Orion* led more than 150 sail of transports and store ships through this passage.

HAEDIK ISLAND, lying 3 miles south-east of Houat, is about $1\frac{1}{4}$ miles in extent, and here excellent water, shingle ballast, and fine sand in abundance may be obtained.

This island is surrounded by a rocky bank, many of the rocks on which are always uncovered, some of them being marked by a beacon, and others only show at low water. At $1\frac{1}{2}$ miles from the south-east point are Les Grands Cardinaux, some of which are always above water, but they have foul ground extending some distance from their south-east side, and therefore should be given a good berth in passing. One of the outer rocks is marked by a beacon. One mile to the S.S.W. of these rocks is a small patch of 3 fathoms, called Basse des Cardinaux, with deep water close to.

Depth of Water.—The Passage des Sœurs, between the shoals on the north-west side of Haedik island and those southward of Houat, has from $3\frac{1}{2}$ to 7 fathoms water, but is narrow and intricate, and no stranger should attempt its navigation, as the tides run through and over the ledges with great velocity.

LIGHT.—On Grongue-Gues rock stands a lighthouse 81 feet high, from which is exhibited, at an elevation of 89 feet above high water, a *fixed white* light, visible in clear weather from a distance of 12 miles.

PLATEAU de la RECHERCHE, lying in an east and west direction, parallel to the northern shore at the entrance of Quiberon bay, is nearly 5 miles in length, and its average breadth is about half a mile. The general soundings over it are 5 and 6 fathoms, but there are several shallow patches of from one to $4\frac{1}{4}$ fathoms. Around the bank there are 7 and 8 fathoms water, mud, and clay, and from its west end, in 4 fathoms, Lomariaker church is open a quarter of a point westward of Point de Port Navallo, bearing N. $\frac{3}{4}$ W.

From Basse Lomariaker, a rocky patch having only 6 feet over it at low water, near the middle of the Recherche bank, and 2 miles from its west end, with Lomariaker church in line with Pointe de Port Navallo, bearing N. by W. $\frac{3}{4}$ W., and the north point of Dumet islet on with the south summit of Beaulieu wood, bearing S.E. by E. $\frac{1}{4}$ E. The Sarzeau, another rocky patch with 6 feet over it, lies one mile eastward of the Lomariaker, with Pointe du Petit Mont just seen open westward of Point du Grand Mont, bearing N.N.W. $\frac{1}{4}$ W., and the north point of Dumet island S.E. by E. 6 miles.

Semaphore.—There is a semaphore on Point du Grand Mont.

✓ **The coast.**—To the northward of the Recherche bank, the eastern shore of the bay, from Pointe de St. Jacques to the entrance of the Morbihan, is bordered by flats, on which are several shallow rocky patches.

The Basse de Thumiac, with $3\frac{1}{2}$ fathoms, the outer of these patches, nearly $2\frac{3}{4}$ miles from the shore, lies with Badene church nearly in line with Navallo point, bearing N. by E. $\frac{1}{2}$ E., and St. Gildas monastery in line with Trest windmills, E. $\frac{3}{4}$ S.

Nearly midway between the Thumiac and the bar of Morbihan lies Basse du Morbihan, with 12 feet water, and Basse de Ker Joanno, with 18 feet water; between Thumiac and Pointe du Grand Mont lies Basse de St. Gildas, with 2 feet water, from which the monastery bears E. by S. $\frac{1}{2}$ S., distant $1\frac{1}{2}$ miles.

The bank near the outer extremity of this shoal is marked by a red buoy.

There is also another rock named the Basse du Grande Mont, awash at low water; it lies nearly one mile S.S.W. of Pointe du Grand Mont, with Lomariaker church in line with Navallo point bearing N. by W. $\frac{1}{2}$ W. This rock is also marked by a red buoy.

For the contour of the coast bank, and the detail of the many other dangers in Quiberon bay, the mariner is referred to the chart.

LIGHTS.—On the north jetty at Port Haliguen, on the eastern side of Quiberon peninsula, a circular tower exhibits a *fixed white* light,

at an elevation of 39 feet above high water, and visible 9 miles in clear weather. The light is obscured between the bearings of N. $40\frac{1}{4}^{\circ}$ W. and N. $25\frac{1}{4}^{\circ}$ W.

River Crac'h.—The river Crac'h empties itself into the northern part of Quiberon bay, and two lights are shown from the left bank at the entrance; the back light is a *fixed white* light, shown from a house, elevated 30 feet above high water, and visible at a distance of 9 miles; the front light is a *fixed red* light, shown from a circular turret, elevated 69 feet, and visible 9 miles. They are 574 yards apart, and when in line, bearing N. by E., lead into the river. The front light is visible only through an arc of 16° on each side of the leading line.

Pointe de Port Navalo.—On Pointe de port Navalo, at the east side of entrance to the Morbihan, is a circular tower, which exhibits, at an elevation of 72 feet, a *fixed white* light, visible 14 miles.

Tides.—It is high water, full and change, at port Navalo, at the entrance of the Morbihan, in the north-east part of Quiberon bay, at 3h. 55m.; springs rise $16\frac{3}{4}$ and neaps $12\frac{3}{4}$ feet. The tides are weak in the bay, but they run strong in the western passages leading to it, and at the entrance of the Morbihan.

Directions.—Entering Quiberon bay from the westward, through the Teignouse passage, give the north extreme of Belle Ile a wide berth of over $1\frac{1}{2}$ miles in passing, to avoid Les Poulains, and then steer about E. by S. $\frac{1}{2}$ S. until La Teignouse lighthouse bears N.E. by E. $\frac{1}{2}$ E. The lighthouse kept on this bearing will lead between the Goué Vas and Milieu patches, until fort Penthievre—at the north end of the peninsula—opens a quarter of a point eastward of fort Riberen N. $\frac{3}{4}$ W., when steer E. by S. into the bay. A vessel may clear the buoy on the Basse du Chenal, and pass through the channel northward of the Goué Vas, by keeping the lighthouse E. $\frac{3}{4}$ N. until fort Ponthievre opens out, when steer about E. by S. $\frac{1}{2}$ S. This channel is narrower than the former, but, being buoyed on either side, will be found preferable.

Proceeding through the Teignouse from the south end of Belle Ile, steer northward until the lighthouse bears N.E. by E. $\frac{1}{2}$ E., when proceed as before.

Entering Quiberon bay at night by Teignouse passage, Teignouse and port Navalo lights should be kept in line until the obscured sector of Port Haliguen light is entered, when the course should be altered about $1\frac{1}{2}$ points to starboard. Leaving the bay by this passage, Pointe des Poulain light should be kept a little open south-

ward of Teignouse light until the obscured sector of Port Haliguen light is entered, when the principal light (revolving white) on Belle Ile should be steered for.

The western entrance of the Beniguet passage bears E. by S. $\frac{1}{4}$ S. from the lighthouse on the north extreme of Belle Ile, and N.E. $\frac{1}{2}$ N. from the south-east extreme. Approaching from the southward, a wide berth should be given to the dangers on the Chaussée de Chevaux, and the Basse Occidentale will be avoided by keeping the west end of Haedik island open west of Chevaux islet until the Men er Broc rock, at the south side of east entrance of passage, is well open northward of Le Rouleau rock, at the south side of west entrance. Le Rouleau, Ile Guric, and the Men er Broc bound the south-east side of the passage, and Le Grand Coin rock, and the $3\frac{1}{2}$ -fathoms patch east of it, the north-west side; all these rocks should be given a fair berth in passing.

To sail through from Quiberon bay, keep St. Gildas monastery on an E. by N. $\frac{3}{4}$ N. bearing until abreast the Men er Broc, then steer West or W. by S. In a vessel of heavy draught, when about $1\frac{1}{2}$ or 2 miles off Le Grand Coin, it should be brought to bear about East, so as to pass between the two Houat banks.

Entering Quiberon bay from the south-westward, steer northward for Haedik lighthouse until the Plateau du Four lighthouse bears E. by S. $\frac{1}{2}$ S., then steer for the latter, passing Haedik lighthouse at the distance of about 2 or $2\frac{1}{2}$ miles, and when it bears N.N.W. steer N.E. into the bay. This latter course leads eastward of the Cardinaux and all dangers near them, and the vessel should haul to the northward round the shoals of Haedik island with discretion for the intended anchorage.

If bound into the Morbihan from a mile eastward of the Cardinaux, about a north course will lead up to the bar, passing westward of the Plateau de la Recherche, the Basse du Grand Mont, and Basse de St. Gildas, and eastward of Basse de Thumiac, the 2 and 3 fathoms patches northward of it, and the bank on which is Méaban isle and several rocks. Within the bar the water will deepen, but a stranger should not attempt to enter without a pilot, for the channel is narrow and the tides strong.

Depth of water.—The bar of the Morbihan has 18 feet over it at low water, and within it deepens to 11 and 15 fathoms.

Anchorage.—There is good anchorage in Haedik road, in 9 fathoms, clay and mud, with the Cardinaux bearing from South to S.S.W.; by anchoring between these bearings a vessel will avoid the rocky ground on the Plateau de l'Artimon. There is also good

anchorage northward of Houat island, between it and the north-east shore of the bay; also in the north part of the bay, north-east of the Quiberon banks, in 6 to 10 fathoms, with Teignouse bearing from W. by S. to S.W.

The coast from St. Jacques point trends E. by S. for 10 miles to Kervoyal point, at the north side of entrance to the river Vilaine. It is of moderate height, indented by little bays and inlets, and bordered in places by flats and shallow patches, which lie $1\frac{1}{2}$ miles off shore. Nearly midway is Penvins point (on which is a battery), the shoal water off it being marked by two black buoys, and immediately eastward of the point is a little inlet, named port Penerf.

The village of Penerf stands on the east bank, about 2 miles within the entrance.*

Depth of water over the bar of port Penerf is 3 fathoms, and $5\frac{1}{2}$ fathoms within it.

Plateau des Mats.—Between Penvins point and Kervoyal point is an extensive rocky flat named Plateau des Mats, which extends in some parts over $1\frac{1}{2}$ miles from the shore. Many rocks on it uncover at low tide, and southward of it is a patch of 6 feet named Basse du Mats, about one mile to the eastward of which is moored a black buoy, upon the northern limit of the *white* sector of Penlan light. To the northward of this buoy is a beacon, on the eastern side of the Plateau.

Le Borénis rock, near the south-west edge of Plateau des Mats, is marked by a red buoy; and Kervoyal shoal, off Kervoyal point, is marked by a stone tower, the top of which is 12 feet above high water.

Bertrand rock, lying $1\frac{1}{2}$ miles E. $\frac{1}{4}$ S. from Kervoyal point, is marked by a red tower with a mast.

From the entrance of the Vilaine the coast trends abruptly to the southward, and has several inflections; but its general trend is S.S.W. $\frac{1}{2}$ W. to Croisic point, which is distant about 12 miles. The shore is generally low, and at a short distance eastward from Croisic will be seen the spire of Bâts church, 200 feet high, standing on the shore $2\frac{3}{4}$ miles south-east of Croisic point, and the spire of Croisic church, 180 feet high, will materially assist to identify the coast.

* La Traverse rock, at the eastern pass of the entrance to Penerf, is marked by a black beacon, which must be left to port when entering from seaward. There are also several other beacons, which mark the channel.

Dumet islet, lying N.N.W. $\frac{1}{2}$ W. $3\frac{1}{4}$ miles from Castelli point, is of an irregular shape, not more than half a mile in extent, and surrounded by a flat, on which are several shoals of 2 to 9 feet; a rock which only appears at low water lies half a mile from its east end. The passage inside this island should not be attempted by vessels of large draught, for the deep water channel is narrow between it and the Plateau de Piriac, which extends nearly 2 miles from Castelli point, and has shoal patches with 5 to 15 feet water over them, one of these, Rothrés shoal, being marked by a black tower.

About $2\frac{1}{2}$ miles south-east of Castelli point is La Turballe, the southern part of the plateau of rocks at the entrance being marked by a black beacon; and there is a red beacon on La Gamelle rock, in the west channel of the port.

Le Croisic.—Between Castelli and Croisic points is the haven of Le Croisic, which is difficult of access, the entrance being encumbered with rocks, of which a patch called Basse Hergo dries 3 feet, and is marked with a red tower. The town, which had, according to the last census, a population of 2,459, has become a favourite watering place, and a road leads from Guérande. The chief imports are oil, coal, cod-fish, and wines. The shipping trade is unimportant, only a few small vessels entering the port annually. There is railway and telegraphic communication. There is a custom-house here, and the quarantine regulations are under the sanitary authorities at St. Nazaire. There are no diseases against which special precautions are necessary. There is an Asylum for old men, where a few beds are reserved for sailors, but these are often occupied. There are no docks at Croisic, and there are no facilities for the repair of vessels; but, in case of need, skilled workmen can be obtained from St. Nazaire and Nantes. No coal can be obtained for steaming purposes, the coal which is imported being for the use of the industrial establishments of the district.

A jetty extends from the town nearly 9 cables to what was formerly the Trehic rock; inside of this the haven dries at low water; the tides in and out are very strong.

Anchorage.—Croisic roadstead, outside the harbour, has good anchorage, in 6 and 7 fathoms water, sand, and shells.

PLATEAU du FOUR.—This dangerous rocky bank, lying from $3\frac{1}{2}$ to $5\frac{1}{2}$ miles westward of Croisic point, is about $3\frac{1}{2}$ miles long and from one to 2 miles broad. There are numerous shallow patches with 2 to 8 feet water over them, and a ledge on its northern part which dries to a considerable extent at low water; the northern part

of this ledge is marked by a round stone light-tower, 92 feet high. From a patch with 5 feet on it, named Goué Vas, at the south extreme of the bank, the semaphore of Romaine is just seen south of the steeple of Guérande church, bearing E. $\frac{3}{4}$ N. Northward of this patch, between it and the ledge, is a small rock that dries $3\frac{1}{2}$ feet, and another near the east edge of the bank awash at low water.

The northern end of the plateau is marked by a red buoy, and the Goué Vas at the southern end by a bell boat-buoy. The bell cannot be easily heard.

Basse Hikeric and Castouillet.—There is a passage with 8 and 9 fathoms water between the Plateau and Croisic point; but the Basse Hikeric, a patch of $2\frac{1}{2}$ fathoms, lies in mid-channel, and another, the Inconnu, of $3\frac{1}{4}$ fathoms, between it and the lighthouse. Croisic point is rocky for some distance off in a northerly direction, and at nearly a mile are shallow heads with 2 feet on them, named Basse Castouillet.

Banc de Guérande.—To the southward of the Plateau du Four is the Banc de Guérande, with $5\frac{1}{2}$ to 8 fathoms water over it, rocky bottom, 6 miles in length north and south, and from one to 2 miles wide. On its northern end is a rocky patch of $3\frac{1}{2}$ fathoms, named Basse Capella, from which du Four lighthouse bears E.N.E. $3\frac{3}{8}$ miles: this patch should be avoided by vessels of heavy draught.

RIVER VILAINE rises near Vitré in the department of Mayenne, and its course is about west to Rennes. From thence it takes a south-westerly direction to the ocean, passing by Redon and Roche Bernard. Its entire length is 135 miles, of which 90 are navigable.

A red beacon stands on the rocks off Halguen point, on the south side of the river entrance, with Penlan point on the opposite side of the river, bearing N.N.E. $\frac{1}{4}$ E., distant $1\frac{1}{2}$ miles.

Navigability.—Vessels of 250 tons burthen can ascend the river as far as Redon.

Rennes has a trade of considerable extent. It stands on the acclivity and at the foot of a hill on the canal of Ille and Rance, at the confluence of the Ille and Vilaine. It is traversed from east to west by the Vilaine, which divides it into the high and the low town, and is crossed by three bridges. There is communication by canal with St. Malo, Nantes, and Brest, and railway communication with Paris.

In 1886, the population of Rennes was 66,140.

Redon, 39 miles from Rennes, is built at the foot of a hill on the Vilaine. It has a good harbour, in which the tide rises 9 to 12 feet, and there is a considerable foreign and coasting trade. There are also building yards, in which vessels of 400 tons have been constructed, and extensive slate quarries.

Dock.—There is a wet dock at Redon, 1,132 feet in length, 197 feet wide, and width of entrance $32\frac{1}{2}$ feet. This dock is connected with the river by a channel 136 feet long.

La Roche Bernard is 9 miles from the sea, on the left bank of the Vilaine, which is here crossed by a fine suspension bridge of iron wire, supported on 2 piers of granite. The opening between the two points of suspension is 626 feet wide, and the elevation of the roadway above high water is 108 feet.

LIGHTS.—Nine lights are exhibited on the part of the coast just described—one on Penlan point, at the north side of entrance to the river Vilaine; two leading lights on the south bank of the river near Trehiguier; two at La Turballe; one from the tower on the ledge of the Plateau du Four; one at Tréhic; and two harbour lights at Le Croisic.

Penlan point.—The square tower on Penlan point exhibits, at an elevation of 68 feet above high water, a *fixed* light, which shows *white* between the bearings of N. $69\frac{3}{4}^{\circ}$ E. and N. $77\frac{3}{4}^{\circ}$ E., indicating the fairway to the river entrance, *red* from N. $69\frac{3}{4}^{\circ}$ E. to the land eastward, and *green* from N. $77\frac{3}{4}^{\circ}$ E. to the land northward, covering the banks formed by the Plateau des Mats.

The white sector should be visible in clear weather from a distance of 13 miles, and the red sector 9 miles.

Trehiguier.—On the extremity of Seal point is a *fixed white* light, 25 feet above high water, shown from a masonry tower, and should be visible in clear weather from a distance of 9 miles. The eastern light is a *fixed red* light, situated 480 yards from Seal point light, exhibited from a square tower, at an elevation of 68 feet above high water, and should be visible in clear weather 9 miles. These lights are in line when bearing S. 49° E., and indicate the course to be pursued; the eastern light is only visible over an arc of 28 degrees, or from S. 35° E. to S. 63° E.

La Turballe.—Two *fixed white* lights, visible in clear weather from a distance of 7 miles. The lights are 40 yards apart, and when in line, bearing E.N.E., lead into the harbour. The high light is situated close to the Life-boat Refuge house, and is elevated 33 feet

above high water, and the low light is elevated 24 feet above high water.

Plateau du Four.—The round tower on the Plateau du Four shows a *revolving white* light which attains its greatest brilliancy every *half minute*. The light is elevated 79 feet above high water, and visible 15 miles; the eclipses do not appear total within 8 miles.

Tréhic.—On the outer extremity of the jetty of Tréhic, at the entrance of Port Croisic, stands a stone tower 33 feet high, from which, at an elevation of 39 feet above high water, is exhibited a *fixed* light, showing *white* between the bearings of S.S.E. and E.S.E. On either side of these bearings the light will show *red* until obscured by the land. In clear weather the *white* light should be seen from a distance of 9 miles, and the *red* light 6 miles.

Le Croisic.—The two *fixed white* harbour lights at Le Croisic are 50 yards apart, and when in line, bearing North and South, show the direction of the channel into the harbour, but lead close to two rocks lying S. $\frac{1}{2}$ E. half a mile from the outer extremity of the jetty. The northern light, elevated 15 feet, bears N. $\frac{3}{4}$ W. 492 yards from the church, visible 6 miles through an arc of 15° on each side of the leading line; the southern light is 33 feet high, and visible 8 miles.

Pilots for the Vilaine and for the Morbihan cruize off Les Cardinaux, and their services are indispensable to strangers.

Directions.—The best passage for a vessel from the westward bound to the river Vilaine is between Les Cardinaux and the Plateau de Four, and north of Dumet isle. Steer so as to bring the Plateau du Four lighthouse to bear E. by S. $\frac{1}{2}$ S., and Haedik lighthouse N.N.W.; then steer N.E. $\frac{1}{2}$ E. until Dumet isle bears S.E. Penlan lighthouse, at the entrance, will then bear about E. by N. $\frac{1}{2}$ N., distant 8 or 9 miles, and to clear the Plateau des Mats, keep the wall beacon open east of Kervoyal point, bearing N.E. $\frac{3}{4}$ E.

Depth of Water.—The soundings on the above courses will shoal gradually from 18 fathoms abreast Les Cardinaux to 8 fathoms off Dumet isle, and to only 10 to 4 feet, at low water, at the entrance of the river. In entering keep in mid-channel, to avoid the rocks extending half a mile from the southern shore. A stranger should have the services of a pilot, as the river navigation is intricate.

Tides.—It is high water, full and change, at the entrance to the river Vilaine at about 3h. 40m.; springs rise 13 feet, neaps 6 feet.

CHENAL du NORD, or North channel to the river Loire, is bounded on the north by the ledges off the shore between Croisic point and the entrance of the river, and on the south by La Banche and La Lambarde banks. There are 8 and 10 fathoms in the northern part of the channel, and the depth decreases in the southern part to about 4 fathoms. From Croisic point the coast trends S.E. $\frac{1}{4}$ E. $5\frac{1}{2}$ miles to Pain Chateau point, and is nearly clear of dangers, excepting those lying close in, and the Basse Lovre, a rocky bank with 3 feet water over it, lying three-quarters of a mile off shore abreast of the Tour des Bâts, the southern edge of which is marked by a buoy.*

To the south-east of Pain Chateau point the shore forms an extensive shallow bay, at the back of which are some sand-hills and the church and mill of Escoublac.

Port le Poulinguen.—In the north-west angle of this bay is the little port Le Pouliguen, where there is a harbour light, but the narrow channel leading to it dries 4 to 6 feet at low tide.

La Vielle rock, in the approach to the harbour, is marked by a beacon painted red on the south-west side and black on the north-east side, surmounted by a vane, the top of which is 20 feet above high water.

Fronting this bay, and extending in a S.E. by S. direction from Pain Chateau point, are a chain of rocks and shoals, some of which are always above water. A black spar buoy is moored at the extreme end of these rocks, to assist vessels in entering Pouliguen and the anchorage behind the Leven rocks. The shoal nearest the point, named Leven, is covered at about half tide, and marked by a pole; near it are several other ledges which cover at high water, and are separated from the point by a narrow channel.

The Troves, a mile to the south-east, are ridges which dry 6 feet at low water.

The Pierre Percée, a mile further south-east, is a small islet about 15 feet above high water, the shoal water on its western side being marked by a red buoy; about half a mile northward of it is the Baguenaud rock, which covers at half tide, and is marked with a pole.

To the eastward of these, but close in shore, are the Vieille rocks, which dry 9 feet, marked by a black tower, and the Fromantières, which dry 2 feet at low water.†

* **Wreck.**—A red buoy marks the position of a wreck, sunk on the southern side of the Chenal du Nord, and about $1\frac{1}{4}$ miles east, from the north end of La Banche.

† A black buoy marks the S.E. extreme of the Ronfle, and a red buoy marks Caillon shoal, which lies about half a mile N.N.W. from the turret on Petit Charpentier.

A black buoy marks the southern edge of Chemoulin bank, and there is also a black buoy moored about 300 yards S.E. from the turret of Saint Marc.

Banc des Charpentiers.—South-east of the Pierre Percée, about half a mile, is Longue Folle reef, upon which the depth is only 5 feet. To the eastward of this reef is the Banc des Charpentiers, which lies on the northern part of the bar at the entrance of the Loire, and has not more than 7 feet on its outer edge; the bank is of sand, and on its western part are two rocks, Le Petit and Le Grand Charpentier, the latter of which dries $10\frac{1}{2}$ feet at low water springs, is marked by a lighthouse, and Le Petit by a small black tower. To the eastward and inshore of this bank are several other shoal patches, all of which are more or less dangerous.

La Banche and La Lambarde banks, on the south side of the Chenal du Nord, are extremely dangerous. La Banche, lying from 5 to 7 miles from the coast, is nearly 4 miles long, N.W. by N. and S.E. by S., and $1\frac{1}{2}$ miles at its broadest part. From the rock of 8 feet least water, on the north-west extreme of the bank, Escoublac church is just seen inside and over Pain Chateau point bearing E.N.E.; and from the rock with 6 feet on it, at the south-east extreme, Poulhaut windmill is in line with Pierre Percée rock, bearing E. by N. $\frac{3}{4}$ N.

One mile within the south-east extreme of the bank is Le Turc ledge, which uncovers 9 feet at low water, and has a light-tower on it 87 feet high; and about a mile to $1\frac{3}{4}$ miles north-west of the tower are other ledges, called Les Trois Pierres, which uncover from 2 to 7 feet. The depths on the remaining portion of the bank vary; some parts are nearly dry, and others have 2 to 3 fathoms over them.

To the westward of La Banche are three patches, named Basse du Turc with $5\frac{3}{4}$ fathoms water over it, Basse de l'Astrolabe with $4\frac{3}{4}$ fathoms, and Basse Michaud with $4\frac{1}{2}$ fathoms, lying respectively S.W. $1\frac{3}{4}$ miles, W. by N. $\frac{1}{4}$ N. $3\frac{3}{4}$ miles, and N.W. $\frac{1}{4}$ N. $5\frac{1}{4}$ miles from the light-tower on Le Turc.

La Lambarde is $3\frac{1}{2}$ miles E.S.E. from Le Turc light-tower, and there are two patches of $4\frac{1}{2}$ and 5 fathoms in the passage between. This shoal, which is about a mile broad, has several patches with from 8 to 11 feet on it, and a rock which dries 2 feet at low water, and from which St. Nazaire church is open a quarter of a point southward of the Tour d'Aiguillon, bearing about E.N.E., and Le Turc light-tower bears W.N.W. $3\frac{1}{2}$ miles.

La Lambarde is marked on the southern side by a bell boat-buoy, but the bell cannot easily be heard. A red buoy marks the northern side of the shoal.

LIGHTS.—The lighthouse on Le Turc ledge of the Plateau La Banche exhibits, at 70 feet above high water, a *fixed red* light, visible in clear weather at a distance of 12 miles. A sector of *green* light is shown over La Lambarde.

At the extremity of the jetty, at port Pouliguen, is shewn a fixed *red* light on an iron lamp-post, elevated 23 feet above high water, and visible in clear weather 5 miles between the bearings of North and N.W.

Le Grand Charpentier.—The lighthouse on Le Grand Charpentier exhibits a *flashing white* light, showing *flashes every five seconds*; also showing a sector of *red* light over all the dangers northward of a line from Le Grand Charpentier to Le Four lighthouse, and a sector of *green* light over La Lambarde. Vessels entering from seaward, and intending to anchor outside the bar, must not pass beyond the southern limit of Le Grand Charpentier *red* light.

RIVER LOIRE, one of the principal rivers in France, and having the longest course, rises on the west slope of the Cévennes, department Ardèche, about 20 miles W. by N. of Privas, and flows generally north and north-west towards Orleans, where it turns to the south-west and west, a direction it maintains till it falls into the sea, 30 miles below Nantes. Its whole course is about 600 miles. It first becomes navigable at Noirie, but the navigation properly begins 45 miles lower at Roanne, which is 450 miles above its mouth. The river since 1846 has been subject to great inundations, owing to the embankments having given way; and the soil brought down by its waters form islands and shifting banks, which materially impede the navigation.*

The Charpentiers bank, before described, is on the northern side of the bar; and on the southern side are, the Verd rock, which uncovers 5 feet at low springs, and marked by a red buoy; the Jardinets reef, which uncovers 2 feet; and the Truie rock, which uncovers 8 feet, has a red beacon on it; and 3 miles within the bar, on the south side of the channel, are the Morées rocks, on one of which is a round red tower, 15 feet high.

The spire of the Church of the Immaculée, at the entrance of the river, is well seen from the offing.

Depth of water.—The entrance of the river Loire is barred by an extensive flat or bar, with from 9 to 16 feet over it at low water,

* See Admiralty plan:—Entrance to Loire river; scale, $m = 1\frac{1}{2}$ inches, on chart No. 2,646.

after crossing which the deep water channel, carrying from 5 to 7 fathoms, is along by the northern shore. The bar prevents ships of large tonnage from entering the river at all hours of the tide. During the winter months the bar deepens, and rises slightly during the summer. For the last 26 years the largest transatlantic steamers have crossed regularly without a single accident.

NANTES is a flourishing commercial town, standing on the summit and ascent of a hill on the right bank of the Loire, 30 miles from its entrance, at the influx into it from the north of the river Erdre, the junction of the two rivers being in the middle of the town. The Sèvre from the south flows into the Loire a little below the town. Commodious quays extend about 2 miles along the Loire, and on both sides the Erdre.*

Nantes has a large shipping trade, and in importance was formerly the fourth port in the empire. The trade is greatly favoured by a canal which communicates with Brest, and by the railway which communicates with all the important towns in France, and there is steam communication with other parts. Ship-building is carried on to some extent, and in 1865 upwards of 8,000 tons was constructed. Iron steam vessels of 2,500 tons, and cruisers of about 6,000 tons, can be built, and machinery made on a large scale, by the *Compagnie des Chantiers de la Loire*.

At the government steam factory (Indret) machinery and boilers for the French Navy are manufactured. There is every facility for repairing machinery, but no dry dock accommodation; and ships requiring repairs to hull must proceed either to Paimbœuf or St. Nazaire. Supplies to shipping can be obtained in abundance. There is no home for sailors.

There are no special quarantine or Custom-house regulations, and no diseases against which special precautions are necessary.

On an island 5 miles below Nantes is the vast government steam factory of Indret, probably the most extensive establishment of the kind in the world; there is, however, neither coal nor iron in the neighbourhood, and the place is not well situated for shipping the machinery, which is conveyed in barges to St. Nazaire.

During the year 1889, 330 vessels of all nationalities, representing an aggregate tonnage of 84,123 tons, entered the port. But owing to the state of the Loire, the vessels which visit Nantes scarcely average 100 tons each, and all vessels of large tonnage remain at St. Nazaire.

* A ship canal is in course of construction between Nantes and St. Nazaire.

The imports are wines, spirits, sugar, coal, iron and other metals, &c. ; and exports, wines, spirits, cereals, flour, and preserved provisions, &c. The population in 1886 was 127,482.

Navigability.—Vessels of $12\frac{3}{4}$ feet draught can proceed to Nantes at high water neaps, and at high water springs vessels drawing $17\frac{1}{2}$ feet can enter the port.

Vessels proceeding to Nantes should enter the Loire at flood tide. When the canal under construction is completed vessels drawing $19\frac{1}{2}$ feet will be able to reach Nantes provided they enter the river on the flood. 1890.

Coal.—The supply of coal is sufficient for any probable demand, but for coaling ships it is found cheaper to procure it in barges from St. Nazaire, at the following prices :—Cardiff, in lighters alongside the ship, if not less than 50 tons, at 21 francs per ton, and for a less quantity, 23 francs ; patent fuel, 23 francs.

Vessels procuring coal at Nantes can do so alongside the quay, where there is a depth of from 11 to 16 feet at low water.

Docks.—There is a dock at Paimbœuf $229\frac{3}{4}$ feet in length on the blocks, 279 feet long over all, and 43 feet wide, with a depth of water over the sill of about 12 feet.

At Nantes there is a floating dock, 159 feet long and from 21 to 24 feet wide. It is in a bad condition, and unfit for use (1887).

ST. NAZAIRE* stands on the north side of entrance of the Loire, and is one of the principal ports in France for the importation of coal, over 500,000 tons being imported annually. Timber, grain, wine, &c., are also imported. The exports are wines, brandies, sardines, grain, &c.

The value of the imports, in 1889, amounted to £2,105,463, and the exports £558,003.

The number of vessels of all nations which entered the port in 1889 was 1,392, the aggregate tonnage being 734,024 tons.

Population in 1886 was 24,204.

There are two ship-building companies, where ships and engines of all descriptions are built and repaired ; and all kinds of supplies can be procured. There is a good hospital, where seamen of all nations are admitted at the rate of 2 francs per diem. There are no diseases against which special precautions are necessary. There is steam communication with other parts, and railway communication to the principal towns.

* See report of British Vice-Consul. St. Nazaire, 1887 and 1890.

The port of St. Nazaire consists, firstly, of a stone mole, forming the small port, which dries at low water, and affords shelter to the pilot boats; secondly, a dock, called the Bassin de St. Nazaire, which is entered by passing between two wooden piers, and through locks; thirdly, a second dock, called the Penhonet dock: these two docks are connected by a large lock.

Adjoining the Penhonet dock are three graving docks. The port dues are moderate, and discharging and shipping of cargoes is effected with great rapidity and economy. It is customary to reckon the discharge of steamers at 200 tons per day, and sailing vessels 70 tons. All vessels using a fire on board are obliged to employ a Fire Guard, who receives 3 francs per day of 12 hours, and 50 centimes per hour during the night.

Navigability.—Vessels of 23 feet draught can navigate the channel and enter the port at high water neaps, and vessels drawing 11½ feet can do so at low water springs.

The greatest draught of any vessel which has entered the port was 26 feet. 1890.

Roadsteads.—One on the left side immediately to the westward, the other on the right side of the river above the old town. The first mentioned (*la grande rade*) varies in depth from 8 to 8¾ fathoms opposite the port; the bottom is of hard mud, affords good holding ground, and is safe in all weather.

Docks.—The dock accommodation consists of two docks, one of 17 acres, with entrances of 82 and 42½ feet in width, and a depth of about 30 feet over the sill at H.W.S.T.; opening out of which, by a lock 465 feet in length and 82 feet wide, is the second dock of 47 acres, and depth over the sill at H.W.S.T. about 26½ feet.

There are three graving docks. No. 1 is 446½ feet in length on the blocks, 459 feet in length over all, 82 feet wide, and about 27 feet over the sill at H.W.S.T. No. 2 is 384 feet long on the blocks, 43 feet wide, and about 15 feet over the sill at H.W.S.T.; this dock is divided into two sections, which can be used separately by two vessels. No. 3 is 492 feet long on the blocks, 505 feet over all, 59 feet wide, and about 27 feet over the sill at H.W.S.T.

The largest ship which has been docked was 7,045 tons.

There is a gridiron 119½ feet in length, and another 394 feet in length is contemplated.

Water is supplied at 2 francs per ton.

Coal.—From 6,000 to 8,000 tons is kept in stock; the average price, free on board in the bunkers, is 21 francs. There is every

facility for coaling steamers, either from railway trucks alongside the wharf or from barges. The largest class of steamers can lie afloat alongside the quay.

Custom-house regulations.—Masters of vessels, on their arrival, are obliged to deliver to the visiting officer of customs a manifest of cargo and a list of all stores on board, and they are liable to be heavily fined for any errors or omissions in their manifest.

Quarantine regulations.—Vessels from ports out of Europe, or ports in the Mediterranean, must be provided with bills of health, endorsed by the French Consul at the port of their departure. On arriving off the port they must hoist the quarantine flag at the fore stay, and keep it flying until they receive pratique. •

LIGHTS.—Two light-towers, Tour d'Aiguillon, 66 feet high, and Tour du Commerce, 108 feet high (leading lights), stand on the northern shore of entrance to the Loire, 2,144 yards apart, and when in line bear from each other N.E. $\frac{1}{2}$ E. and S.W. $\frac{1}{2}$ W.

Tour d'Aiguillon, the southern tower, exhibits, at an elevation of 118 feet above high water, a *fixed white* light, visible in clear weather at a distance of 17 miles.

Tour du Commerce shows, at 197 feet above high water, a *fixed white* light, varied every *two minutes* by a *flash*, preceded and followed by an eclipse, and should be visible from the distance of 21 miles. In ordinary weather the eclipses are not total within 6 miles.

Ville-es-Martin point, a *revolving red* light, attaining its greatest brilliancy every *half minute*, is shown at an elevation of 33 feet above high water, and visible 11 miles; within a distance of 4 miles the eclipses are not total.

Point de l'Eve.—From a low iron tower on the summit of point de l'Eve, a *fixed red* light is shown through an arc of 32° , at an elevation of 103 feet above high water, and visible 9 miles. When within this light, and it becomes masked by Tour d'Aiguillon, a vessel will be in the deep water channel leading to St. Nazaire; when seen north of that light she will be approaching La Ville-es-Martin; and when seen south she will be in danger of running on the Morées rocks.

St. Nazaire.—A *white* light, *occulting* at intervals of *four seconds*, exhibited, at an elevation of 26 feet above high water, from a circular turret on the new mole-head of St. Nazaire, visible 8 miles.

There is a *red* light on the north side of the dock entrance, and a *green* light on the south side.*

Brivet.—At the entrance to Brivet, on the northern bank, $1\frac{1}{4}$ miles N.E. of St. Nazaire, are shown two harbour lights,—the first, on a lamp-post elevated 20 feet above high water, is a *fixed red* light, visible 4 miles.

St. Mean.—The other on the tower of the church of St. Mean, 113 yards west of the former, is a *fixed white* light, elevated 37 feet above high water, visible at the distance of 5 miles.

These lights in line indicate the entrance to Brivet.

Paimbœuf.—From a circular turret at the extremity of the mole is exhibited a *fixed white* light, visible 8 miles.

Pierre à l'Œil, fixed *white* light, visible through an arc of 28° , or from the bearings of N. 88° E. to S. 64° E.

Pierre Rouge.—From a circular stone tower is exhibited, at an elevation of 33 feet above high water, a fixed *red* light, visible 5 miles.

Corsept.—Three *fixed* lights, elevated about 31 feet above high water, are shown from wooden posts erected near Corsept.

The western light is a *green* light, and the eastern is *red*. The northern or intermediate light is *green*.

These lights, with Pierre à l'Œil light indicate the course to be followed in order to clear Perret bank, which, approaching Paimbœuf from the westward, should be left on the port hand, as also Alluard rock, and the shoals which are left on the starboard hand.

The northern and eastern lights in line bearing S. 45° E. indicate the channel between Alluard rock and Perret bank (the south-west part of which has disappeared). The northern and western lights in line bearing S. 64° W. indicate the channel between Pierre à l'Œil and Perret bank. Lastly, Pierre à l'Œil light bearing N. 88° E. (southward of which it is obscured) indicates the southern limit for vessels proceeding from one to the other of these leading lights.

Tides.—It is high water, full and change, at St. Nazaire at 3h. 47m. springs rise 17 feet, neaps 13 feet. The tide rises 2 feet in the first hour of flood, $3\frac{1}{2}$ feet the second, 4 feet the third, $2\frac{1}{2}$ feet the fourth, 2 feet the fifth, and one foot the sixth hour.

Pilots for the Loire will be found cruising off Les Cardinaux rocks, and the mouth of the river, weather permitting; and pilots for

* One *red* light prevents any vessel entering. Two *red* lights, vertical, allow steamers only to enter.

the navigation of the river up to Nantes may be obtained at St. Nazaire, as well as a steam-tug, by hoisting the pilot flag at the mast-head. The tariff is not higher than in England and America.

Directions are given for entering the Loire, but as changes constantly occur in the depths on the bar and banks at the entrance, from floods, winds, or other disturbing causes, a stranger should always avail himself of the assistance of a pilot.

The **Chenal du Nord** may be entered by passing northward of the **Plateau du Four**, and then between it and **Croisic** point; but with southerly winds it will be more convenient to sail between the **Four** and **La Banche**. The south-east end of the **Four** will be avoided by keeping **Guérande** church (tower destroyed in 1879) open eastward of **Croisic** church spire; and the north-west end of **La Banche**, by keeping **Guérande** church a little open north-west of the spire of **Bâts** church, bearing about N.E. by E.; this latter mark will lead between the **Michaud** and **Astrolabe** patches. Continue with either of these marks on until the **Four** lighthouse bears N.W. by N., thence with this bearing astern a S.E. by S. course will lead into the **Chenal du Sud**, and up to the bar marks.

To cross the bar at night, steer in with the **Aiguillon** (*fixed*) and **Commerce** (*flashing*) lights in line until near the bar, when the latter light should be brought a little open eastward of the former. When the revolving red light of **Ville-es-Martin** is in line with the occulting white light on the jetty of **St. Nazaire**, keep on that line until the **Aiguillon** and *fixed red* light on the **Pointe de l'Eve** are in line, which latter lights lead just southward of the black **Bell** buoy on the extremity of the **Ville-es-Martin** shoal. The mariner will have no difficulty in following these routes during the day, or in reversing them when leaving the river. The **Bonne Anse**, a shoal with 7 feet water on it, will be left on the port hand in going on; it lies with the pilots' mast in line with **Tour d'Aiguillon**, and the mill westward of **Tour du Commerce** in one with the coast-guard station at **Portsay** point.

BOURGNEUF BAY.—From **St. Gildas** point on the south side of entrance to the Loire the coast is moderately high, and trends abruptly to the south-east for $5\frac{1}{2}$ miles to the small port of **Pornic**, which dries at low tide; but a considerable trade is carried on, and the place is much frequented for sea bathing.

Seven and a half miles farther south is the town of **Bourgneuf**, and about $1\frac{1}{4}$ miles inland, which gives its name to the bay; but strangers desirous of running up to this place must have a pilot.

Thence the shore trends in a south-westerly direction for $10\frac{1}{2}$ miles to the Goulet de Fromantine. Here Ile de Noirmoutier, almost joining the mainland, trends to the N.N.W., and forms the south-west side of this extensive bay.*

DANGERS.—The navigation of Bourgneuf bay is much impeded by rocks and shoals:—the Banc de Kerouars, lying parallel with the northern shore, $1\frac{1}{2}$ miles southward of St. Gildas point, is $4\frac{1}{2}$ miles long, half a mile wide, and the general depths on it are from one to $2\frac{3}{4}$ fathoms over sandy bottom; but there are several rocky patches of 3 and 4 feet, and a rock which uncovers 7 feet at low water. This latter, named La Couronnée, lies half a mile within the western end of the bank, and $2\frac{1}{2}$ miles west of the south extreme of St. Gildas point, with Pierre Percée rock in line with the most western sand-hills of Escoublac, bearing about N. $\frac{1}{4}$ E.

A red buoy with reflectors is moored N.W. by W. nearly $1\frac{1}{4}$ miles from La Couronnée rock.

About 3 miles eastward of the Kerouars bank, and abreast of Pornic harbour, are the Notre Dame and Caillou banks, studded with rocks, many of which dry at low water; each of these banks is marked by a beacon. These rocks range about $1\frac{1}{2}$ miles from the coast, and between them and the shore to the eastward there is no passage, as extensive rocky flats dry some distance from the land, and the Pierre du Chenal, which uncovers 2 feet at low springs, lies about S.S.W. $2\frac{1}{2}$ miles from Pornic lighthouse, and is marked on its south-west side by a black bell buoy.

La Pierre Moine rock, lying E.N.E. $2\frac{1}{2}$ miles from Charniers point, the north-east extreme of Noirmoutier, is always uncovered, being 3 feet above high-water springs, and is marked by a beacon, coloured red and white.

Basse des Pères, with 7 feet water, lies W.N.W. $1\frac{1}{2}$ miles from La Pierre Moine rock, and a shoal of $2\frac{1}{4}$ fathoms lies S.E. $\frac{1}{3}$ S. $2\frac{1}{4}$ miles from the rock; a red buoy is moored nearly a quarter of a mile from the south-east side of Basse des Pères.

A shoal of $2\frac{1}{4}$ fathoms lies $1\frac{1}{2}$ miles N.W. by N. from Pierre Moine beacon, and about three-quarters of a mile N.E. of Basse des Pères.

Blanche bank, one mile long, has only 2 feet of water over it, and its east extreme lies $2\frac{1}{4}$ miles N. by E. $\frac{3}{4}$ E. from La Blanche

* The spire of La Plaine church, situated on the high ground $2\frac{1}{4}$ miles from St. Gildas point, and which serves as a landmark, has been partially destroyed by lightning. See Paris. *Annuaire Hydrographique*, No. 68. 31st May, 1885.

ruined **Abbey**, and about $1\frac{1}{2}$ miles north of Martroger beacon. A red conical buoy with staff and globe is moored three-quarters of a mile N. $\frac{3}{4}$ W. from the east extreme of the bank.

The head of the bay, from a little south-east of Pornic, is bordered with shallow water and rocks, and the southern part dries at low springs, 5 miles from the shore.

The northern coast of Ile de Noirmoutier is surrounded with rocky ledges and other dangers, some of which are 3 miles from the land. A black buoy is moored on the S.E. extreme of a shoal, having one foot of water over it, situated about a mile westward of Pointe de Herbaudierre, the north-west extreme of Ile de Noirmoutier; and $2\frac{1}{2}$ miles from the same point is Pilier islet, with a light-tower on its northern end; 3 miles E. by S. $\frac{1}{2}$ S. from Pilier islet, and one mile from the shore, lies Martroger rock, which is marked by a beacon and a red buoy a short distance north-east of it; nearly a mile east of this rock lies Roches des Pères, marked by a beacon; and two-thirds of a mile N. $\frac{3}{4}$ E. from Martroger beacon is a rock with 4 feet over it at low water; it lies nearly midway between Blanche bank and the beacon.

The Grand and Petit Sécé are situated $1\frac{1}{2}$ miles east of Pilier islet, the former having a striped beacon on it.

Outside Pilier is a rocky ledge, named Les Chevaux, the northern end of which is three-quarters of a mile from the light-tower, one of the rocks being marked by a pole. Both this ledge and the Chaussée des Bœufs (which has a red bell beacon on Le Bavard, its south-west extremity), to the southward, should be approached with caution, and a vessel should not stand into a less depth than 10 fathoms at low water. A black bell buoy marks the extreme of the shoal water extending from Chaussée des Bœufs, moored W. by S. $\frac{1}{4}$ S. $3\frac{3}{4}$ miles from Le Bavard.*

Anchorage.—On the south side of Bourgneuf bay good anchorage may be obtained in 5 fathoms, sand and mud, with Les Pères rocks beacon in line with Ile du Pilier lighthouse, bearing W. by N. $\frac{1}{2}$ N., and La Pierre Moine rock beacon North. This anchorage is safe except during a north-west gale.

Semaphore.—There is a semaphore on Pilier islet.

LIGHTS.—The tower on the north end of Pilier islet exhibits, at an elevation of 105 feet above high water, a *fixed white* light, varied

* This buoy is sometimes out of position.

by a *flash* every *four minutes*, and visible in clear weather at a distance of 16 miles ; a *red* sector is shown to the south-west, covering the Chaussée des Bœufs between the bearings N. $\frac{3}{4}$ E. and N.E. $\frac{3}{4}$ E., visible 14 miles ; and covering La Couronnée reef at the south side of entrance to the river Loire, a second *red* sector of light is also shown.

Pornic.—A *fixed white* light is shown from a square tower on the west point (Noveillard point) of entrance of Pornic, on the northern shore of Bourgneuf bay, at an elevation of 66 feet above high water, and visible 9 miles.

Dames point.—On Dames point, $1\frac{1}{4}$ miles northward of the entrance to the port of Noirmoutier, is a square tower, red on the two southern faces, which exhibits, at an elevation of 112 feet above high water, a *fixed white* and *red* light ; the white light is visible at a distance of 9 miles, and the red at a distance of 14 miles. The white light is visible from seaward round a great part of the horizon ; a *red* sector is shown in the direction of the Chaussée des Bœufs through an arc of about 30° , visible 13 miles ; a *red* sector is also shown between the bearings of S. 12° W. and N. 76° W.

Bec de L'Epois.—A *fixed* light is exhibited from Bec de L'Epois, southern shore of Bourgneuf bay, visible over an arc of 12° , covering from Marsouin rock on the east to Goëland rock on the west.*

Directions.—Approaching Bourgneuf bay from the westward, the dangers off the north-west end of Noirmoutier will be avoided by giving the lighthouse on Pilier islet a berth of about 2 miles, or by not standing into less than 10 fathoms water. When the lighthouse bears South $3\frac{1}{2}$ miles, steer S.E. by E. $\frac{3}{4}$ E. till Noirmoutier church bears S.S.W. $\frac{3}{4}$ W., when the vessel will be eastward of the Blanche bank, on which there are only 2 feet water, and of the patch of $2\frac{1}{2}$ fathoms lying $1\frac{1}{2}$ miles to the eastward of it. As before stated, the east extreme of this bank lies $2\frac{1}{4}$ miles N. by E. $\frac{3}{4}$ E. from La Blanche ruined abbey. (See page 96.)

Then steer for the red and white beacon on Pierre Moine rock, which may be passed on either side, avoiding the 3-fathom patch which lies one mile S.E. by E. $\frac{1}{4}$ E. from the beacon, when the vessel may take a pilot for Bourgneuf, or run to the southward for Rade du Bois de la Chaise with Pierre Moine rock bearing North ; and when Noirmoutier church bears W.S.W. steer for it, anchoring in $2\frac{1}{2}$ or 3 fathoms at low water, about $1\frac{1}{2}$ miles off shore or $2\frac{1}{2}$ miles from the church ; or the vessel may be anchored farther off in deeper water (page 97). Care must be taken to avoid a shoal, more than half

* Goëland rock and the north point of La Préoire rocks are marked by red beacons.

a mile in extent in an east and west direction, with one to 3 feet water on it, in the northern part of this anchorage, with its east end bearing about E. by N. $\frac{1}{2}$ N. from La Cobe rock, and S. by W. $\frac{1}{3}$ W. from the Pierre Moine.

Tides.—It is high water, full and change, at Noirmoutier at 3h. 17m. ; springs rise 17 feet, and neaps 13 feet.

ILE de NOIRMOUTIER is 10 miles long N.N.W. and S.S.E. irregular in shape, being a quarter of a mile broad in the middle and $3\frac{1}{2}$ miles broad at its northern part ; the shores on all sides are studded with dangers. The town of Noirmoutier is on the eastern side, and its little tidal harbour will admit vessels of 50 or 60 tons burthen. The south end of the island is separated from the mainland by a narrow channel, the Goulet de Fromantine, which is nearly choked up with sand, and can only be navigated by vessels of light draught, with a local pilot. The channel is buoyed. On the northern side of the Goulet is a small fort, and on the southern side the land rises to the Fromantine mountains.*

LIGHTS.—For proceeding up the channel, there is a *fixed white* light, illuminating about five-eighths of the horizon, elevated 18 feet above high water, visible about 5 miles. This light is shown from a square wooden shed, with standard painted black, situated on the shore 109 yards southward of the barricade of piles of Fromantine. For proceeding down the channel, there is a *fixed white* light, visible through an arc of about 30° , elevated 39 feet above high water, visible in clear weather in the centre of the sector about 10 miles. This light is shown from a square wooden shed, painted black, placed back to back with La Croix black beacon.

A *fixed green* light, visible only a short distance, is exhibited from the extremity of the jetty at port L'Herbaudière.

Life-boat.—There is a life-boat stationed at Pointe de l'Herbaudière, the north-west extreme of Ile de Noirmoutier.

ILE D'YEU, lying nearly 10 miles off the coast southward of Noirmoutier, is $5\frac{1}{2}$ miles long N.W. and S.E., and about 2 miles broad, and the prominent object on it is St. Sauveur church with its pointed steeple. The soil is scanty, the whole island being a mass of granite ; on its west side steep, and on its east side low and flat.

Ports Mule and Breton.—There are two small harbours,—port de la Mule on the south-west shore, and port Breton, the chief

* See Admiralty chart :—France, west coast, sheet 4, Les Sables d'Olonne to Bourgneuf, No. 2,647 ; scale, $m = 0.5$ of an inch ; also Bay of Biscay, No. 1,104 ; scale, $m = 0.07$ of an inch.

port of the island, on the north-east shore ; but they dry every tide and will only admit small craft. Port Breton is protected by a fort, and there are several batteries placed on the most prominent points of the island.

From port Breton to Corbeau point, the south-east extreme, the shore is fronted to the distance of $1\frac{3}{4}$ miles with rough, uneven ground, upon which the depths are from $1\frac{1}{2}$ to $4\frac{1}{2}$ fathoms.

Chiens Perrins rock.—The north-west end of the island is encumbered with rocks, the outermost of which, named Chiens Perrins, lies nearly three-quarters of a mile from the land ; there are many rocks between these and port Breton, but none farther off than half a mile.

La Sablaire shoal.—About a mile east of port Breton lies La Sablaire, a shoal, three-quarters of a mile long N.N.E. and S.S.W., and a quarter of a mile broad, with 9 to 15 feet water ; the northern edge of this shoal is marked by a black buoy and the southern edge by a red buoy.

Pont d'Yeu bank.—The eastern end of the island is connected in some measure with the mainland, at the village of Notre Dame de Monts, by a bank with 3 to 4 fathoms water over it, sandy and rocky bottom, called Pont d'Yeu, over which, unless in case of necessity, it would be imprudent for a vessel of more than 15 or 16 feet draught to venture at low tide. The deepest water is about one-third over from the island to the shore, and towards the mainland it is very shallow, the depth being only 3 feet, $3\frac{1}{4}$ miles from the shore, and $1\frac{1}{2}$ fathoms at $3\frac{3}{4}$ miles ; a red buoy in $2\frac{1}{2}$ fathoms marks this shoal water.

Corbeau rock, about $1\frac{1}{2}$ cables eastward of Corbeau point, is marked by a black tower, the top of which is 13 feet above high water, surmounted by a spherical vane and reflector.

LIGHTS.—A *fixed white* light is exhibited from a tower standing on an elevated spot about a mile within the north-west extreme of Ile d'Yeu. The light is elevated 177 feet above high water, and visible in clear weather at a distance of 20 miles.

On Corbeau point, the south-east extreme of Ile d'Yeu, is a square tower, from which is exhibited a *fixed red* light, at an elevation of 64 feet above high water, and visible at a distance of 8 miles.

Port Breton Lights.—From a lighthouse, 20 feet high and painted red, on the extremity of the north-west pier at port Breton is exhibited, at an elevation of 26 feet above high water, a *quick*

flashing light, visible through an arc of $163\frac{1}{2}^{\circ}$; showing *white flashes* between the bearings of N. $55\frac{1}{2}^{\circ}$ W. and S. $9\frac{1}{2}^{\circ}$ E., and *red flashes* between S. $9\frac{1}{2}^{\circ}$ E. and S. 39° E. The white light should be seen in clear weather from a distance of 9 miles; the red light from a distance of 6 miles.

With the white light in sight, vessels will be clear of the dangers near point Gautier and those south-eastward of port Breton; also of du Boite shoal, north-westward of that port.

The south-west limit of the sector of red light leads half a cable seaward of Cantin shoal, so that vessels approaching from the north-westward, with the flashing red light in sight, are clear of that danger; but it should be borne in mind that the red light is shown over du Boite shoal.*

Leading lights.—Two *fixed green* lights are also shown,—one at the head of the harbour, and the other at the south side of the entrance; these lights are visible 9 miles, and when in line, bearing S.W. $\frac{1}{4}$ S., mark the direction of the channel into port Breton.

Life-boat.—A life-boat is stationed at port Breton.

Tides.—It is high water, full and change, at Ile d'Yeu at 3h. 28m. springs rise $14\frac{3}{4}$ feet, neaps $10\frac{3}{4}$ feet.

Anchorage.—The best anchorage off Ile d'Yeu is in about $5\frac{1}{2}$ fathoms water, with its north-west end bearing West, the east end S. by E., and St. Sauveur church S.S.W., distant $2\frac{1}{2}$ miles: in this position a vessel will be about $1\frac{1}{3}$ miles off shore.

A vessel may also anchor off the south side of the island, but a berth of upwards of half a mile must be given to the shore, as dangers lie nearly that distance from it. The best position is in 13 to 16 fathoms, fine sand, with Corbeau point bearing N.E. by N., distant about 2 miles; or more to the eastward in a similar depth, on mud and sand, with the point bearing N.W. by N.

COAST.—The west coast of Noirmoutier island, with the mainland, trends in a general S. by E. direction about 40 miles to Pointe de l'Aiguille. Devin point, the west extreme of Noirmoutier, is bordered by flat rocky ground (Chaussée des Bœufs), the principal ledge of which dries 5 to 10 feet at low springs, and extends $3\frac{1}{2}$ miles off shore. The outer or south-west part of this ledge has a beacon on it,

See plan of Port Breton on chart. Les Sables d'Olonne to Bourgneuf, No. 2,647, sheet 4.

with shallow water beyond ; and at 7 miles from Devin point the depth is only 4 fathoms, which is marked by a black bell buoy (*see* page 97).

Between the Goulet de Fromantine and the village of Notre Dame de Monts the sandy shore is low, and fronted by flat rocky ground and shallow water to a distance of $3\frac{1}{4}$ miles off, marked by a red buoy in $2\frac{1}{2}$ fathoms.

A rocky ledge extends in a W. by S. direction from the shore a little southward of the village, and dries for $1\frac{1}{2}$ miles off at low water ; and at about the same distance farther out is a patch which also uncovers at low water.

Les Marguerites lie from one to $2\frac{1}{2}$ miles off shore, with the church of the village bearing E. by S. $\frac{1}{2}$ S.

Bass de l'Aigle, a rocky shoal, three-quarters of a mile in extent, lies N.W. by W. $\frac{1}{4}$ W. from the church and $5\frac{1}{2}$ miles off shore : there are only $1\frac{1}{2}$ to 2 fathoms over it, and $2\frac{3}{4}$ fathoms between it and the flat bordering the shore ; but outside the shoal the water deepens to 6 and 7 fathoms. About one mile south-west of Basse de l'Aigle a red buoy is moored in 7 fathoms water.

From Notre Dame de Monts the shore for $10\frac{1}{2}$ miles to Gross Terre point is fronted by an extensive shallow flat. A red buoy is moored in $2\frac{1}{2}$ fathoms water, at about $4\frac{1}{2}$ miles west of Notre Dame de Monts. Gross Terre point and the coast for about $1\frac{1}{2}$ miles north of it is cliffy and rocky.

ST. GILLES-SUR-VIE a small tidal harbour close to the southward of Gross Terre point ; but it will not admit vessels over 120 tons burthen. The town is in a valley, but it will be recognised by its vicinity to a large wood. Small vessels anchor in 7 to 12 feet at low water, in the road outside the harbour, between Pilours island, 12 feet high, and a rocky bank, named the Bonneau, which is awash at low tide.

LIGHTS.—On the head of the grand mole, at the north side of entrance to the harbour of St. Gilles-sur-Vie, a *fixed white* light is shown at an elevation of 39 feet above high water, and is visible 5 miles in clear weather. The light is obscured seaward, and will not become visible from a vessel until she has entered the port.

Leading lights.—The direction for entering the harbour of St. Gilles-sur-Vie is indicated by two lights, 284 yards apart, N. 58° E. The outer light is a fixed *red* light, 22 feet above high water, visible in clear weather from a distance of 9 miles. The lighthouse is a

square tower, situated near Croix de Vie quay, painted red on its front side.

The inner light is a *fixed* light, 88 feet above high water, with *white*, *red*, and *green* sectors; it will show *red* between the bearings of N. 74° E. and N. 62° E., or from Grosse Terre point to the southern extreme of Pilours rocks; *green* between N. 18° E. and N. 7° W., or from the western extreme of Bonneau rock to the coast eastward; and *white* in all other directions seaward. Within a distance of about one mile from the coast northward of Grosse Terre point, the *white* light will be obscured by the land between the bearings of S. 50° E. and N. 74° E.

POINTE de l'AIGUILLE.—The shore from St. Gilles-sur-Vie continues its southerly direction for about 13 miles to Pointe de l'Aiguille, having no danger farther off than about half a mile from the land; but in approaching the point the lead must be kept going, and the soundings not decreased under 12 fathoms at low water by day, or 15 fathoms at night, to avoid Les Barges d'Olonne ledges, which extend 2½ miles N.W. by W. ¾ W. from the point, and parts of which uncover at low water.

Basse Vermenou.—From the westernmost danger, a patch of 4 fathoms, named Basse Vermenou, the church of Sables d'Olonne is just seen south of Chaume mill, bearing about E. by S. ¾ S. St. Jean mill open south of La Grange farm, bearing S.E. by E. ¾ E., will lead clear of the south side of these dangers, and up to the leading mark for entering the harbour of Sables d'Olonne.

LIGHT.—On the Grande Barge d'Olonne is a round tower, from which is exhibited, at an elevation of 75 feet above high water, a *fixed* light, varied every *three minutes* by a *red flash*, visible at a distance of 14 miles. The Petite Barge d'Olonne, which is about half a mile southward of the lighthouse, is marked by a tower, and a buoy fitted with an automatic whistle, is moored to the westward of it.

PORT Les SABLES d'OLONNE.*—This small tidal harbour dries at the lowest tides, and a stranger should not attempt to enter without a pilot. The entrance is between two piers or breakwaters, both projecting southward; that on the east side is the larger, and extends from the west end of the town of Sables d'Olonne; and that on the opposite side from the outer extreme of the harbour, on a

* See plan on chart; De la Coubre point to Les Sables d'Olonne, No. 2,648, sheet 3.

ledge of rocks, which protects it from the westward. A battery and a small church with a steeple (St. Nicholas) stand on the point, and about one-third of a mile to the north-westward is fort l'Aiguille, and also a semaphore.

The chief export is grain, of the annual value of about £25,000 ; and the chief import is coal, of the annual value of about £30,000.

On an average 200 vessels of all nationalities, representing an aggregate tonnage of 150,000 tons, enter the port annually.

There is communication by railway and electric telegraph.

There are no special custom-house or quarantine regulations, and no diseases against which special precautions are requisite.

There is a hospital and home for sailors.

The population in 1886 amounted to 10,200.

Coal.—A large quantity of coal is kept in store, the price being from 16 to 18 shillings a ton.

Coaling is performed alongside the wharf, where there is 18 or 20 feet depth of water.

Docks.—There is a wet dock at Sables d'Olonne 935 feet long, with an average width of 443 feet, and width of entrance 54 feet, Depth of water over the sill at H. W. S. T. about 19½ feet.

There is a gridiron 213 feet long and 33 feet wide, also two slips 171 feet long and 82 feet wide.

The draught of the largest ship yet docked was 17 feet 8 inches.

There are few facilities for the repair of vessels.

Dangers.—The roadstead and approaches to the harbour are eastward of three rocky shoals :—The Noura of 7 feet, the Nouch of one foot, and the Barre Marine of 24 feet water, lying south of St. Nicholas church. The latter is one mile from the entrance to the port, and nearly three-quarters of a mile from the eastern shore ; but in bad weather the breakers from the Noura and Nouch extend to the middle of the roadstead, making it an unsafe position to be in should the wind blow strongly on shore, when it would be impossible either to make sail or enter the harbour.*

LIGHTS.—Two *fixed white* lights are established for entering the harbour of Les Sables d'Olonne—one from a large square tower at La Chaume, on west side of entrance, and the other from a circular turret on the head of the great jetty on east side of entrance. The lights are

* A wreck on the Nouch rock is marked by a red buoy, which must be left on the starboard hand when entering the south-west channel from seaward.

elevated respectively 105 and 36 feet above high water, visible at the distance of 10 and 9 miles, and when in line, bearing N. by W. $\frac{1}{4}$ W., lead through the principal channel to the entrance.

There are also two *red* lights near La Chaume.

Two lights are exhibited from towers erected to the south-east of the town of Les Sables d'Olonne, as leading lights through the south-west pass of the roadstead,—a *fixed red* light on the river bank, named the Stockade light, elevated 33 feet above the level of high water, and a *fixed red* light, named the Potence light, bearing E. by N. $\frac{1}{4}$ N., distant 420 yards from the Stockade light, and elevated 93 feet above the level of high water. Both lights, in clear weather, should be seen from a distance of 9 miles. They will be visible through an arc of about 16° on each side of the line of direction, and the power of the light diminishes as that line is departed from.*

DIRECTIONS.—Vessels entering the port of Sables d'Olonne by the south-west pass should keep the Stockade and Potence lights in line, bearing E. by N. $\frac{1}{4}$ N., until the two lights of La Chaume are in line, which lead to the channel between the jetties.

Vessels entering by the south-east pass, or Great channel, should keep the jetty light a little open to the eastward of Chaume light-house until the two red leading lights are in line, and from this point the lights of La Chaume may be kept in line.

Caution.—The two red leading lights in line will take a vessel only some 60 yards from the 2-fathoms edge of the Nouch rock, and about the same distance from a shoal with 18 feet water over it on the opposite side of the channel.

A Life boat is stationed at La Chaume.

Tides.—It is high water, full and change, at St. Gilles-sur-Vie, and at Les Sables d'Olonne, at about 3h. 27m.; springs rise $12\frac{1}{2}$ feet, neaps $9\frac{1}{2}$ feet.

The coast from Sables d'Olonne trends about S.E. by S. 16 miles to Grouin du Cou point, only 30 feet high, and on which there is a semaphore; the shore is low all the way, and skirted by many rocky shoals. From thence the shore runs $11\frac{1}{2}$ miles farther to the south-east to Aiguillon point, and forms the north-east side of the Pertuis Breton or Breton channel.†

* It is proposed to exhibit a light on St. Nicholas mole head, to indicate the depth of water over the lock sill at the entrance to the basin (1883).

† See Admiralty chart:—France, west coast, sheet 3, Point de la Coubre to Les Sables d'Olonne, No. 2,648; scale, $m = 0.5$ of an inch; also Bay of Biscay, No. 1104; scale, $m = 0.07$ of an inch.

LIGHTS.—On Grouin du Cou point, at the north side of entrance to the Pertuis Breton, is a square tower, which exhibits a *fixed white* light, at an elevation of 92 feet above high water, visible in clear weather at a distance of 9 miles.

Aiguillon point.—On Aiguillon point, in the eastern part of of the Pertuis Breton, a *fixed white* light is shown from a wooden beacon, at an elevation of 43 feet above high water, and visible 9 miles.

ILE de RÉ lies parallel to, and about $5\frac{1}{2}$ miles off the coast just described, and forms the south side of the Pertuis Breton. The island is rather low, 13 miles long, N.W. and S.E., and its breadth is irregular, averaging about 3 miles, but near the north-west end it is nearly separated by a narrow isthmus not more than 170 yards across. The northern shore is much indented, and there are several good havens, particularly those of the villages of Ars and La Flotte, and the small town of St. Martin, which is the principal place. The last is defended by a citadel of considerable strength, and there are forts on other parts of the island.

The soil of this island is not fertile, scarcely producing either corn or pasture, but the vine thrives well, and is cultivated. A considerable extent of surface is occupied by salt marshes. The principal employment of the population is fishing and the manufacture of salt. There are also several distilleries of brandy.

Dangers.—The island is surrounded by a shallow bank, and from its north-west end a reef extends N.N.W. a long $2\frac{1}{2}$ miles, and skirting the south-west side of the island, projects nearly the same distance southward from Chanchardon point, at 4 miles to the south-east, thence continuing, at $1\frac{1}{2}$ to three-quarters of a mile from the shore, to Chauveau point, the south-east extreme of the island.

Docks.—There is a wet dock at St. Martin 885 feet long, average width 118 feet, width of entrance 39 feet, and 17 feet over the sill at H.W.S.T. There is also a gridiron 164 feet in length, and 36 feet wide, and a heaving down slip 164 feet long, and 131 feet wide.

LIGHTS.—On Baleines point, the north-west extreme of the Ile de Ré, is an octagonal tower, which exhibits, at an elevation of 166 feet above high water, a *flashing white* light, showing a succession of groups of *four flashes*, the interval between two consecutive groups being ten seconds, and visible in clear weather at a distance of 20 miles. The light is electric, but it is reduced in power and loses the distinctive character of an electric light from about S. by W. $\frac{1}{4}$ W. to W. by N. There is a semaphore to the southward

of the lighthouse, and a tower to the northward, which distinguishes it from Chassiron lighthouse, where both these structures are situated to the northward.

A Life-boat is stationed at Baleines point.

Haut-banc du Nord.—On the Haut-banc du Nord, at about $1\frac{1}{2}$ miles N.N.W. from the north-west extreme of the island, is a circular tower, which exhibits at 75 feet above high water, a *fixed white light*, visible 14 miles. The mariner is warned that dangers extend more than a mile seaward of this light.

Mer du Fief.—Two lights are exhibited on Pointe du Fief, west side of the entrance of the Mer du Fief (Fiers d'Ars).

The upper is a *fixed green light*, exhibited from a window of the keeper's dwelling, at an elevation of 36 feet above the level of high water, and should be seen in clear weather from a distance of 8 miles.

The lower is a *fixed white light*, exhibited from an iron post, bearing E. $\frac{3}{4}$ S. distant 370 yards from the upper light, and elevated 28 feet above high water; it should be seen in clear weather from a distance of 7 miles.

These lights in line indicate the channel into the Mer de Fief.

St. Martin.—Two *fixed lights* are shown at St. Martin; one a *red light*, from a circular turret standing on the salient angle of the demi-bastion at about 109 yards east of the entrance of St. Martin, at an elevation of 56 feet above high water, visible between S. 60° E. through south and N. 38° W. from a distance of 6 miles; and the other a *green light*, from an iron post on the mole, at an elevation of 24 feet, and visible 2 miles.

La Flotte.—From an iron post on the new mole is exhibited, at an elevation of 33 feet above high water, a *fixed white light*, visible in clear weather 9 miles.

Chauveau Point.—A *fixed white light* is shown from a tower on the outer edge of the reef extending from Chauveau point, the south-east extreme of the island. The light is elevated 59 feet above the sea, and visible 13 miles. There is a *red sector* shown from this tower, to cover all the rocks along the south coast of Ile de Rè, as far westward as Point de Chanchardon. A sector of *red light* is also shown through an arc of 75° , or from N. $73\frac{3}{4}^{\circ}$ E. to N. $1\frac{1}{4}^{\circ}$ W.

PERTUIS BRETON, the passage between Ile de Rè and the coast is 16 miles in length, and from 5 to 7 miles wide, but banks and shoal water extend a long distance off both shores. Vessels

of large draught must keep nearer the island than the main. The eastern part of the passage is encumbered by an extensive mud flat, over the greater part of which there are not more than 8 or 9 feet at low-water springs ; but the channel over it is clear of danger, and vessels of proper draught cross it and enter Basque road through Rade de La Pallice, the narrow channel between the south-east end of the island and the mainland.*

Anchorage.—Vessels can anchor in the Pertuis Breton, and be sheltered from all winds but those from the north-westward, in 9 and 10 fathoms, and clear of the banks that are well defined on the chart. There is good anchorage for small vessels in 2 and 3 fathoms in the roadsteads off St. Martin and La Flotte. Aiguillon bay, on the north-east shore, dries at low water, but it affords shelter for vessels that can take the ground, which is of soft mud, and an excellent place for vessels to run for in the event of losing masts or anchors.

Only vessels of light draught can enter the little harbour of St. Martin, as the bar at the entrance dries nearly 5 feet at low tide.

Directions.—To sail into the Pertuis Breton, the light-tower on Aiguillon point bearing S.E. by E. $\frac{3}{4}$ E. will lead in the deep water channel at the entrance, between the northern extreme of the Baleines reef and the long narrow bank extending W.N.W. from Grouin du Cou point. When the light-tower on this latter point bears N.E. $\frac{3}{4}$ N. steer S.E. $\frac{1}{2}$ E. until St. Martin church bears S.W. then run towards the church, and anchor in from 5 to 3 fathoms water, sand and mud. Vessels of heavy draught may anchor farther out in 8 or 9 fathoms. If the wind is contrary be careful to avoid the bank extending at least $2\frac{1}{2}$ miles eastward from Loix point.

But should a vessel be bound into Aiguillon bay, proceed as before until Grouin du Cou western light-tower bears N.E. $\frac{3}{4}$ N. then steer S.E. $\frac{1}{2}$ E. until Aiguillon point light-tower bears E. $\frac{1}{2}$ N., then steer with this latter tower a point on the port bow, and gradually haul into the bay. The channel is narrow and the water shoals rapidly as the vessel advances. A boat-buoy fitted with a bell, and painted red and black in horizontal stripes, is moored on the eastern side of the channel, abreast Aiguillon point.

If bound to Rochelle and the vessel's draught admits, bring Aiguillon light-tower to bear N.E. by E., and St. Martin church

* See Admiralty chart :—Environs de la Rochelle, Rades des Basques et d'Aix, with plan of La Rochelle, No. 2,746 ; scale, $m = 1\cdot5$ inches.

W. $\frac{1}{2}$ N., then steer for St. Marc point, and through Rade de la Pallice, the narrow channel between the south-east end of Ile de Rè and the mainland. Having passed the beacon on the ledge of St. Marc point, haul in towards the shore until Plomb point is shut in with Repentie point, then either steer for the harbour, or anchor in about 3 fathoms water, at half a mile E.S.E. from the tower on the Lavardin, or farther in according to the vessel's draught.

LA PALLICE.*—The new port of La Pallice is situated off the roads of La Pallice, the best and most sheltered anchorage on this coast (where the French ironclad squadron is sometimes anchored), and about one mile north-west of Pointe de Chef de Baie, entrance to La Rochelle.

Dry Docks.—There are two dry docks in course of construction on the south-west side of Bassin de la Pallice; they will probably be completed about June 1891. The larger dock, No. 4, is 590 feet in length over all, with 72 feet breadth of entrance, and a depth over the sill of $26\frac{1}{2}$ to 31 feet at high water ordinary springs; this dock can be divided into two docks, one of 372 feet, the other of 213 feet in length. No. 2 dock is 364 feet in length over all, with 46 feet breadth of entrance, and a depth over the sill of 23 to $27\frac{1}{4}$ feet at high water ordinary springs; this dock can be divided into two docks, one of 228 feet, the other of 131 feet in length.

Wet Docks.—The harbour works of La Pallice, which, with the exception of the dry docks, will probably be completed about the end of 1890, consist of the Avant port of 31 acres area, and 35 feet in depth at high water springs. At the eastern end of the Avant port is the lock by which Bassin de la Pallice is entered. This lock is 771 feet in length between the outer gates, and 541 feet between the inner gates, with $72\frac{1}{2}$ feet breadth of entrance, and a depth of $35\frac{1}{2}$ feet on the sill at high water springs. Bassin de la Pallice is 2,300 feet in length, 656 feet to 394 feet in breadth, with a depth of about 32 feet with the water at the level of high water springs; it has an area 28 acres, and 5,250 feet of quayage.

The docks are lighted by electricity.

The port was opened in August 1890, and when completed and in full working order, will be furnished with steam cranes, store-houses

* From report of H.B.M. Vice-Consul at La Rochelle—Oct. 1890.

for cargo, &c. It will be connected by railway with the central station at La Rochelle.*

Coal.—The facilities for coaling vessels are good.

ILE D'OLERON lies off the coast abreast the mouths of the Charente and Seudre rivers. Its northern part is separated from Ile de Rè by the Pertuis d'Antioche, and its southern part from the mainland by the Pertuis de Maumusson, which communicates with Aix road, but leads more directly into the river Seudre.

The island is $16\frac{1}{2}$ miles long, N. by W. and S. by E., and its greatest breadth is about 6 miles. It is of moderate height, the soil very fertile, and on first making it from seaward a peculiar and well-marked saddle will be seen not far from Chassiron point, its north extreme, on which is a lighthouse, with a tower and semaphore close to the northward of it. On its south-east side is the town of Le Chateau, where there are building slips, distilleries, rope walks, &c. St. Pierre, the principal town, stands near the centre of the island.

Oleron is almost entirely surrounded by flats and rocky reefs, which on the western side extend in places 2 miles off shore, and should not be approached within the depth of 10 or 11 fathoms at low water. The extensive flats of sand and mud bordering the eastern side dry at low water; and between the island and the main are numerous shifting sands making the navigation dangerous.

Antioche rocks, extending N.E. nearly $1\frac{1}{2}$ miles from the north end of the island, dry in many places. Near the north extreme of these rocks stands a refuge beacon painted red. There is also a refuge beacon at point Chardonnière, on the west side of the island, but as it is almost surrounded by trees, it is scarcely visible from seaward. Off Gatseau point, the south end of the island, are two wooden beacons.†

LIGHTS.—On Chassiron point, the north extreme of Ile d'Oleron, is a round tower, which exhibits, at 164 feet above high water, a *fixed white* light, visible in clear weather at a distance of 19 miles.‡

* Vessels are forbidden to anchor or navigate within the limits marked out. viz. on the north by a line joining Saint-Marc beacon and a black buoy to the westward marked Pallice No. 1; on the west by a line parallel to the coast, joining buoy No. 1 and two black buoys marked Nos. 2 and 3; and on the south by a line joining buoy No. 3 and the south pier. No. 2 is a bell buoy.

At night a *red* light, visible one mile, is shown from the coffer-dams; and in foggy weather whistles will be sounded at intervals not exceeding two minutes.

It is intended to exhibit a *red* light on the head of the north pier, and a *green* light on the head of the south pier.

† There is a gridiron at Le Chateau, 82 feet long and 20 feet wide.

‡ See Baleines light, page 106.

Pérotine.—A *fixed white* light is also shown from an iron post on the jetty head at Pérotine, on east side of Ile d'Oleron, at an elevation of 20 feet above high water and visible 7 miles.

Port Chateau.—At the east part of Port Chateau are two round turrets, N.N.W. and S.S.E. of each other, 261 yards apart; from each is shown a *fixed white* light, elevated respectively 33 and 77 feet above high water; visible in clear weather at a distance of 9 miles.

PERTUIS D'ANTIOCHE and BASQUE ROAD.—The Pertuis d'Antioche is the passage between the islands of Oleron and Rè, and leads to Basque and Aix roads, and Rochelle and Rochfort; but the tides in it are strong, and strangers should have the aid of a pilot.

Basque road is bounded on the south-west by the Longe and Boyard banks, and on the east by Ile d'Aix, and flats and other dangers extending some distance off the mainland, which should not be approached by a stranger within the depth of 5 fathoms. Aix is a low, strongly fortified islet, surrounded by ledges and flats, and the road is just to the south-west of the islet, between it and Longe or Boyard bank, and has from 6 to 10 fathoms water. There is no passage, except for boats, between it and the main at low water.

Anchorage.—There is good anchorage in Basque roads in 6 to 10 fathoms, muddy bottom.

LIGHT.—A *flashing white* light, showing *flashes every five seconds*, is exhibited from a turret on the fort at the south end of Ile d'Aix. A sector of *red* light is shown through an arc of 15° , or from the bearing of S. $45\frac{1}{4}^{\circ}$ E. to S. $60\frac{1}{4}^{\circ}$ E. The light is elevated 66 feet above high water, and visible 13 miles.

Directions.—Vessels entering the Pertuis Antioche must be careful to avoid the Antioche rocks off the north end of Ile d'Oleron, and the ledges running off the south-west side of Ile de Rè, and the Plateau du Lavardin, which is a rocky flat lying $1\frac{1}{2}$ miles off its south-east end. The northern part of this flat is marked by a stone beacon, 33 feet high, painted in red and black alternate horizontal bands, erected on a rock which dries 3 feet.* In entering keep in mid-channel, and do not approach either Ile de Rè or Oleron within the depth of 9 or 10 fathoms, until the Chauveau lighthouse on the ledge off the south-east end of Ile de Rè bears N.N.E.; then steer for Aix island, anchoring either in Basque or Aix road.

* An experimental *quick flashing* light is exhibited from the beacon on Lavardin, it is shown automatically day and night without being permanently attended to. See Notice to Mariners, No. 351, 1888.

At night, the light on the south end of Aix bearing S.E. by S. will clear the shoals off the east side of Ile d'Oleron, and lead to an anchorage in the southern part of Basque road.

LA ROCHELLE, the capital of the department of Charente Inférieure, stands on the shore in a bight to the north-east of Basque road, and is the residence of the principal consular officers of foreign countries, a British Vice-Consul resides here. The port of La Rochelle is well situated for commerce, fully sheltered, and has an inner and outer basin. The entrance of the outer basin is 54 feet wide, with depth of water over the sill of about 23 feet at spring tides; the inner basin has about 17 feet over the sill at low water spring tides, with a breadth of entrance 39 feet. There is a dock (harbour) which dries at low water, used principally for passengers and fishing boats, and has no railway alongside. There is also a patent slip. There are careening wharfs, several building and repairing works, with a full supply of materials for repairing machinery. The Digue du Cardinal, which encloses the port, projects from either side, leaving an opening midway to the town. The quay, bordering the port, is planted with trees, and forms an agreeable promenade. A steam-vessel for training coast pilots is stationed at this port.

The chief exports are wine, dried fish, building materials, and spirits; and the imports are coal, wood, iron ore, cod fish, and palm oil. The average number of vessels of all nationalities that enter the port annually is 350, representing an aggregate tonnage of 170,000 tons. Water and supplies for merchant shipping are abundant. The population (1886) was 23,829.

Steamers run regularly to Havre, Dunkirk, Bayonne, and other French ports; and there is frequent steam communication to foreign ports, and daily steamers to Ile de Rè and Ile d'Oleron. There is railway communication to all parts of France, and telegraphic communication with all the world.

There are no special custom-house or quarantine regulations, and no diseases against which special precautions are necessary. There is a hospital where sailors are admitted on an order from the Vice-Consul, and his guarantee for expenses.

Navigability.—Vessels of $16\frac{1}{2}$ feet draught can navigate the channel and enter the port at high water neaps, and vessels drawing from 20 to 22 feet can do so at high water spring tides, but no vessel can enter at low water springs. The greatest draught of any vessel which has entered the port was 22 feet—1890.

Coal.—From 500 to 1,000 tons are usually kept in store, the price ranging from 15 to 22 shillings a ton, according to quality. Coaling is performed by steam cranes, as well as baskets, alongside the wharf, where there is a depth of from $16\frac{1}{2}$ to 22 feet in the outer dock, and 11 to 15 feet in the inner dock, at low water.

Docks.—There are two wet docks at La Rochelle: Bassin extérieur, 1181 feet in length, and 256 feet in breadth, with 54 feet breadth of entrance, and a depth of about 23 feet on the sill at high water ordinary springs.

Bassin intérieur, 417 feet in length, and 344 feet in breadth, with $39\frac{1}{2}$ feet breadth of entrance, and a depth of about 17 feet on the sill at high water springs.

There is a gridiron 259 feet in length, with a breadth of entrance of $32\frac{1}{2}$ feet.

LIGHTS.—At La Rochelle there are two harbour lights: one a fixed *white* light, shewn from a tower on the east quay of the inner floating basin, and 79 feet above high water, is visible 9 miles; the other, a fixed *red* light, west of the floating basin, and 257 yards W. $\frac{1}{2}$ S. from the former, and 46 feet above high water, visible 9 miles. These two lights in line lead into the harbour, and they are visible only through an arc of 16° on either side of the line of direction. The east tower is octagonal and white; the west tower round and white, the upper part of which is red on the side towards the passage.

RIVER CHARENTE rises on the frontier of the department to which it gives its name. Its first direction is about north to Civray; it then bends round to the westward and proceeds to the southward to Mansle; here it becomes extremely tortuous, but still keeps its southerly direction till it reaches Angoulême. It now runs westward, passing Cognac and Saintes, when it resumes its original course to the northward, and, passing Rochefort, pursues a winding course for about 10 miles to fort de la Pointe on the right and port des Barques on the left bank, below which the shores separate and form an estuary 5 miles in length, to Ile d'Aix.

The whole course of the river is about 200 miles. It is navigable for small vessels as far as Montignac, 60 miles from its mouth, and for vessels of large draught, with the tide, to Tonnay-Charente, $3\frac{1}{2}$ miles above Rochefort; but at low water there is only a few feet of water at the entrance to and in the river. Flowing generally through a rich and fertile valley, it is of great importance, both from the facilities it gives to transport and the numerous public works upon

its banks. A little above Rochefort, two canals, the Brouage and Charras, lead off, the one from its left and the other from its right bank, intended to drain the salt marshes around Rochefort, which made the whole district very unhealthy.*

Time ball.—At Fouras, from the tower westward of the naval observatory, a balloon is hoisted close up at 5 minutes before signal, and dropped by electricity from the naval observatory at 10h. 0m. 0s. a.m. Paris mean time, corresponding to 21h. 50m. 39s. Greenwich mean time. Signal is repeated after an interval of 2 minutes.

LIGHTS.—From an iron pillar at the end of the pier of Fouras north harbour, a *fixed white* light is exhibited at an elevation of 21 feet above high water, and should be seen from a distance of 7 miles.

On the northern bank, at the entrance of the Charente river, are two white square towers, N.W. and S.E. of each other, and 656 yards apart. The eastern tower exhibits a *fixed white* light, at an elevation of 44 feet above high water, and the western tower a *fixed red* light, at an elevation of 24 feet; in clear weather these lights are visible 11 and 6 miles. The *white* light shows through an arc of 9° , and the *red* 15° , on either side of the centre of the channel.

On the southern bank, at the entrance of the same river, are two similar towers, N.N.W. $\frac{1}{4}$ W. and S.S.E. $\frac{1}{4}$ E. of each other, 536 yards apart, each showing through an arc of 32° , and at an elevation of 44 and 17 feet respectively above high water, a *fixed green* light, visible in clear weather 9 miles.

Directions.—Vessels entering the Charente at night should keep the *white* and *red* lights on the north bank in a line until the two *green* lights on the south bank are in line, which will lead to the anchorage of port des Barques.

By day the tower des Fouras and the new tower are useful landmarks for navigating the entrance of the river.

ROCHEFORT stands on the right bank of the Charente, about 10 miles from its entrance. It is built partly on a height, and partly on a low flat, and is surrounded by ramparts, planted with trees, which afford a shady promenade. Its streets are wide, well paved, and intersect each other at right angles; the houses are low but neatly built; and the only buildings of consequence are those connected with the naval arsenal. The largest edifice is the Hôpital de la Marine, on an eminence outside the town, which contains 1,300 beds.

* At Tonnay-Charente there is a gridiron 121 feet long and 23 feet wide.

Rochefort owes much of its importance to its admirable position, which has made it conspicuous among the naval arsenals of France.

There is commodious dock accommodation, several building slips, a gridiron 120 feet long and 44 feet wide, and 100 tons sheers.

Shipbuilding is the principal branch of industry. The trade is corn, colonial produce, salt, wine, brandy, &c. Water and all supplies for shipping are plentiful. There is railway communication to all parts of France, and steamers to Royan and Bordeaux.

319 vessel of all nationalities entered the ports of Tonnay-Charente and Rochefort in 1889, the aggregate tonnage being 170,920 tons. The value of the exports for the same year amounted to £2,433,100.

The population in 1886 was 31,255.

Depth of water.—The river abreast the town of Rochefort is about three-quarters of a cable wide, and the general depths are 18 to 20 feet at low water.

Coal.—Rochefort being a Naval port, presumably there is a large quantity of coal in store at the dockyard, and also with private firms.

Docks.—No. 1 dock is 195 feet in length on the blocks, 51 feet breadth of entrance, with about 15 feet over the sill at high water spring tides.

No. 2 dock, is 246 feet in length on the blocks, 47 feet breadth of entrance, with about $16\frac{1}{2}$ feet over the sill at high water spring tides.

No. 3 dock is 370 feet in length on the blocks, $68\frac{1}{2}$ feet breadth of entrance, with about $25\frac{1}{2}$ feet over the sill at high water spring tides.

The Old dock is 246 feet in length on the blocks, 50 feet breadth of entrance, with about 13 feet over the sill at high water spring tides.

At the Commercial port there are three wet docks, or basins, and the locks of basins No. 1 and 2 are each 208 and No. 3 lock is 345 feet long.

No. 1 dock is 525 feet long, width 210 feet, width of entrance 46 feet, and about $25\frac{1}{2}$ feet over the sill at high water spring tides.

No. 2 dock is 492 feet long, width 295 feet, width of entrance 46 feet, and about $25\frac{1}{2}$ feet over the sill at high water spring tides.

No. 3 dock is 1,444 feet long, 436 feet wide, width of entrance 59 feet, and about 33 feet over the sill at high water spring tides.

These docks, which are situated on the right bank of the river a little above the town, are for the use of merchant vessels.

Harbour Works.—A new commercial port is now under construction, and in 1885 was well advanced. Some of the quay walls

are completed. Dredging operations are being carried on for the removal of the shoals of Martroux, Soubrise, and Fongueux, in the river Charente.

Time ball.—At St. Louis tower a balloon is hoisted close up at 5 minutes before signal, and dropped by electricity from the Naval Observatory at 10h. 0m. 0s. a.m., Paris mean time, corresponding to 21h. 50m. 39s., Greenwich mean time. Signal is repeated after an interval of 2 minutes.

PERTUIS de MAUMUSSON is a narrow winding channel between the south end of Oleron island and the mainland, which should not be attempted without the aid of a pilot. It is about one mile wide between Maumusson and Arvert points, at the western entrance, where there is a shifting bar. The entrance has been marked by buoys, the outer buoy with black and red stripes being moored in 5 fathoms, $2\frac{3}{4}$ miles W. by N. from Maumusson point.

Depth of water.—Within the bar, with only 6 feet over it at low water, and on which a heavy sea breaks in bad weather, the water deepens, and there are from 3 to 8 fathoms between the sand-banks for a distance of $2\frac{3}{4}$ miles, after which there are sandy flats with narrow channels between them, marked by buoys and beacons, leading to Aix road and Seudre river. Within this river there is water for vessels of the largest draught; but the sands fronting the entrance frequently shift, and a stranger should not attempt its navigation without a pilot.

LIGHT.—A *fixed white* light is exhibited from a lantern suspended from the gable of the keeper's dwelling, at Pointe de Mus de Loup, entrance of Seudre river. The light is elevated 22 feet above high water and is visible over an arc of 196° , or between the bearings of N.W. $\frac{1}{4}$ N., through West to S.S.E. $\frac{1}{4}$ E.; in clear weather it should be seen from a distance of 9 miles.

Tides.—It is high water, full and change, at Rochelle, at 3h. 5m.; ordinary springs rise $16\frac{1}{4}$ feet, and neaps $11\frac{1}{4}$ feet. At Ile d'Aix, Basques road, at 3h. 35m., springs rise $16\frac{3}{4}$ feet, and neaps 13 feet. At Rochefort, at 4h. 0m., springs rise $16\frac{3}{4}$ feet and neaps 13 feet. In the Seudre river entrance, at 3h. 35m., springs rise $13\frac{1}{2}$ feet, and neaps 10 feet.

PLATEAU de ROCHE BONNE is one of the most dangerous shoals off the west coast of France, particularly to vessels bound to Rochefort and the neighbouring ports. It is an extensive rocky flat, $7\frac{1}{2}$ miles long, N.W. by N. and S.E. by S. nearly, and between one and $1\frac{1}{2}$ miles broad, lying between the parallels of $46^\circ 8\frac{1}{2}'$ and $46^\circ 14'$. There

are two rocky heads, called La Congr  e and Roche du Sud-Est, with 15 and 24 feet water over them, marked on the chart; but there may be many others, as the extent of the breakers in bad weather is nearly 6 miles.

La Congr  e, on the north-west part of the shoal, is in lat. $46^{\circ} 12' 10''$ N., long. $2^{\circ} 26'$ W. and W. by N. $\frac{1}{4}$ N., distant 36 miles from the lighthouse on the north-west end of Ile de R  .

Roche du Sud-Est, a rocky head, of 24 feet, lies about $2\frac{3}{4}$ miles S.E. $\frac{1}{2}$ S. of La Congr  e.*

CAUTION.—Considerable caution is necessary when navigating in the vicinity of the Roche Bonne, there being deep water close to on all sides of it. A little eastward there are from 25 to 33 fathoms, red sand and shells; to the westward the water quickly deepens to 60 fathoms, soft bottom.

The **TIDES** also run strong over it, about 2 knots at springs; the flood sets N.N.E. It is high water, full and change, between 5h. and 6h., and the rise is about 12 feet.

LIGHT VESSEL.—A light vessel, painted red, with two masts, surmounted by skeleton balls, is moored in 26 fathoms on the east side of the Plateau de Roche Bonne, and shows two *fixed white* lights, the one being 46 and the other 33 feet above the level of the sea, and in clear weather should be seen from a distance of 12 miles.

Mariners are warned against placing too much dependence on the vessel always retaining her position.

RIVER GIRONDE.†—From the Pertuis Maumusson a low shore trends S.S.W. $\frac{1}{2}$ W. 6 miles to Coubre point, at the northern side of the estuary of the Gironde, the entrance to which is about 10 miles wide; but, with the exception of the Passe du Nord and Passe du Sud, it is nearly blocked up by dangerous banks and patches of shallow water. These channels, as well as the banks within the river, are buoyed; the black buoys should be left on the port side in entering and ascending, and the red to starboard, as usual. The buoys are liable to break adrift in bad weather.

Vessels drawing $8\frac{3}{4}$ feet can navigate the channel from sea to Bordeaux at low water springs, and vessels of 19 to 20 feet draught can do so at high water neaps. (See page 119.)

The entrance to the Gironde will be readily distinguished by the

* An experimental light-buoy, painted red, with the words Rochebonne Congr  e on it, is moored about $6\frac{1}{4}$ cables north-east of La Congr  e rock. The light is *fixed white*, visible in clear weather from a distance of 8 miles.

† See Admiralty chart:—France, west coast, sheet 2, No. 2,664; scale, $m = 0.5$ of an inch.

Cordonan light-tower, a handsome structure, 207 feet high, standing on a bed of rocks which dry at low tide, S. by E. $7\frac{1}{4}$ miles from the lighthouse on Coubre point. This point is low, but there is a dark brown light-tower on it, 98 feet high, a beacon close to the northward of the tower, and a black tower, called the Tour de Bonne Anse, a mile to the eastward. These—together with Terre Nègre fort; the light-tower on the downs of Pointe de la Palmyre; Terre Nègre light-tower, coloured black and white and beyond it the church, mill, and village of St. Palais; the Chay light-tower; and the light-tower and church of Royan—are all conspicuous objects on the north shore of entrance. A light-vessel with two masts is moored, in 8 fathoms of water, about 2 miles S.S.W. of Coubre point.*

Opposite Royan is Grave point, the south point of entrance to the river, on which is a wooden light-tower, 82 feet high, and three-quarters of a mile to the westward of it is the light-tower of St. Nicolas; these in line form the leading mark for the *Passe du Sud*. Twice a day the names of vessels entering and leaving are announced at Bordeaux from the semaphore at Pointe de Grave; but in order that the names may be given correctly, vessels must be supplied with the International Code of Signals.

There are many towns and villages upon the banks of the Gironde, but the first trading place of consequence is the town of Pauillac, on the left bank, 27 miles above Grave point, where vessels of too large draught to ascend to Bordeaux usually discharge, and outward bound vessels provision and water. At about 5 miles farther up, on the opposite bank, is the town of Blaye, remarkable for its citadel and fortress. Between, several islets are formed in the middle of the river, and on one of them is fort Pâté (so called from its round shape), which crosses its fire with that of the fortress of Blaye on the right bank and of fort Médoc on the left, and thus commands the passage of the river, which is here only $1\frac{1}{2}$ miles wide. 7 miles above Blaye is the conflux of the rivers Garonne and Dordogne; and about 13 miles above this, on the left bank of the Garonne, stands the commercial city of Bordeaux.

The Garonne rises in the central Pyrenees, in the valley of Aran, in Spain. Its whole course is about 300 miles. Of these, 45 miles, commencing at the point where it enters France, are sufficiently deep to float timber from the Pyrenees. At Toulouse it is joined by

* There is a refuge tower, in the woods, at point Coubre.

NOTICE.—As there are numerous wrecks on the banks at the entrance of the Gironde, mariners are cautioned to keep the channel marked by the buoys.

See Paris Notice to Mariners, No. 156, 1887.

the canal du Midi, communicating with the Mediterranean, after **which** it flows through a wide and almost continuous plain ; but its **channel** continues shallow, it is subject to frequent inundations, and **brings** down so much débris, that it cannot be considered quite clear **for** navigation higher up than the town of Marmande. The influence **of** the tide is felt about 25 miles below this town, near Langon. The **whole** course of the Dordogne is about 290 miles, of which 170 miles, **beginning** at Mayronnes, are navigable.

BORDEAUX, the capital of the department of Gironde, is one **of** the largest, handsomest, and most opulent cities in France ; as a maritime and commercial place being second only to Marseilles and Havre. The town is built in the form of a crescent, $2\frac{1}{2}$ miles long and a mile broad, on the western bank and along the bend of the Garonne river, 55 miles from the sea, and its extensive quays are generally crowded with shipping up to the handsome stone bridge, 531 yards in length, of 17 arches, which spans the river.

Besides the immediate access to the sea by the river, Bordeaux has **the** advantage of a direct communication with the Mediterranean by **the** Canal du Midi, and is thereby enabled to supply the south of **France** produce as cheaply as Marseilles, to which it is connected by railway.

There are numerous docks and building-yards for vessels of every size. The trade is extensive, particularly in wines, spirits, skins and fur, tissues, jewellery, and fruits. In 1888 the exports amounted to £16,466,360, and the imports £15,483,432. In 1889, 2,000 vessels, amounting to 1,337,790 tons, entered the port ; of these, 668,368 tons were British.

There is steam communication with the United Kingdom and transatlantic ports, &c. ; by railway with the interior, and by telegraph with all parts of the world. The Canal du Midi communicates with the Mediterranean at Cette, but its average depth is less than 6 feet, so that it can only be used by small vessels.

There is every facility for repairs both to hull and machinery of vessels, and water, coal, and all supplies are abundant. There are no special hospitals or homes for sailors, but there are two hospitals into which sailors are admitted, at the rate of two francs per day.

No special quarantine or Custom-house regulations are in force, but a quarantine establishment is maintained at Pauillac.

There are no ailments against which special precautions are necessary.

The population in 1886 amounted to 240,582.

Navigability.—Vessels of 19 to 20 feet draught can navigate the channel from sea to the port at high water neaps, and vessels drawing $8\frac{3}{4}$ feet can do so at low water springs. The greatest draught of any vessel which has entered the port was $22\frac{1}{4}$ feet—1890.

Docks.—The wet dock, built in T shape, has an area of 100 acres with about $27\frac{3}{4}$ feet water over the sill at high water spring tides. There are about 5,700 feet of quayage. There are two locks 500 feet and 446 feet in length, and 72 and 46 feet in width. The dry dock, adjoining the wet dock is $426\frac{1}{2}$ feet long on the blocks, and 72 feet width of entrance, with 27 feet over the sill at high water; this dock is lighted for work at night by the electric light. The largest vessel which has been admitted to these docks was of 3,100 tons register.

There is also a dry dock capable of taking a vessel of 1,000 tons—two patent slips for vessels of 3,000 and 800 tons respectively, and a gridiron which will take a vessel of 500 tons.

At Lormont there is a dry dock, a floating dock, and two patent slips.

The dry dock is 174 feet long (inside) and width of entrance 36 feet, with a depth of 15 feet over the sill at high water. The largest vessel which has been docked was of 500 tons register. The floating dock (wooden) is 195 feet long; width of entrance $40\frac{1}{2}$ feet. The largest vessel which has been docked was of 600 tons register.

Patent slips, at Lormont. One of these slips is arranged for hauling up vessels broadside on; it has two cradles, one for vessels of 186 feet of keel, and one for vessels of 165 feet of keel. Both cradles may, if required, be united into one. The largest vessel which has been placed on this slip was of 2,500 tons register. The other slip has a cradle 180 feet long, and 30 feet wide. The largest vessel placed on this slip was 225 feet in length, and 450 tons register.

At Royan there is a gridiron $98\frac{1}{2}$ feet long, and 23 feet wide.

Careening.—There are four small careening places (gravel) at Lormont, for examining vessels not exceeding 500 tons.

Harbour works.—Works are in progress for deepening the navigable channel at Bordeaux, and in the river between Bordeaux and Pauillac. It is intended to construct more extensive quays at Bordeaux, to facilitate the loading and discharging of vessels.

Coal.—The quantity of coal usually kept in store (afloat) for ships, is about 2,000 tons, consisting of Welsh steam coal, English, and Scotch. The average price during 1886 for Welsh coal was 17s.

and for English or Scotch coal 16s. per ton, free into bunkers. The total quantity of coal imported by sea to Bordeaux in 1886 was about 435,000 tons, of which 430,000 tons came from the United Kingdom.

Steamers at Bordeaux are always coaled from lighters; there is however, a public wharf (Sursol's wharf) where a stock of 500 to 1000 tons may usually be found; the depth of water at this wharf is 15 to 20 feet at low water and 25 to 30 feet at high water neap or spring tides; the bottom is muddy.

LIGHTS.—The following lights are established at the entrance to the Gironde :—

Cordouan rocks.—The circular tower on the Cordouan rocks, near the middle of the entrance, exhibits, at an elevation of 194 feet above high water, a *revolving white* light, attaining its greatest brilliancy every *minute*, and visible in clear weather at a distance of 21 miles; the eclipses do not appear total within 10 miles. The light shows *red* in an angular space of about 81° , when bearing between S. by W. $\frac{1}{4}$ W. and W. by N.

Pointe de la Coubre.—At Pointe de la Coubre, the north point of entrance to the Gironde, a *fixed white* light is shown at an elevation of 121 feet above high water, and visible 17 miles.

Grand Banc light-vessel, with black and red bands, exhibiting two *fixed white* lights, one on each mast, elevated 34 and 23 feet, visible 11 miles, is moored in 8 fathoms S.E. of la Mauvaise shoal, and in line with Cordouan lighthouse when bearing S.S.E.

During thick and foggy weather a bell is sounded, at the light-vessel, *five* times every *thirty* seconds. See fog signals, page 2.

Pointe de la Palmyre.—On the downs of Pointe de la Palmyre, S.E. by E. $\frac{1}{2}$ E. about 5 miles from the light-tower of Pointe de la Coubre, a light-tower constructed on three pillars, exhibits an *alternating red* and *green* electric light, every *twenty* seconds, at an elevation of 167 feet above high water, visible in clear weather 19 miles, through an arc of 45° , between S.E. $\frac{1}{2}$ E. and E. $\frac{1}{2}$ N. The upper part of the tower is black, the lower part and the pillars being white.

On Falaise, $4\frac{1}{2}$ miles N.E. $\frac{1}{4}$ E. from Cordouan lighthouse, stands a black and white tower from which, at an elevation of 46 feet above high water, is exhibited a *fixed red* light, visible 11 miles.

Terre Nègre tower, black and white, $2\frac{1}{2}$ miles S. by E. $\frac{1}{2}$ E. of

the Palmyre lighthouse, exhibits, at an elevation of 121 feet above the sea, a *fixed white* light, obscured southward of an E.S.E. bearing visible 15 miles.

Falaise and Terre Nègre lights in line lead northward of Monrevel bank.

Chay tower is square white, the upper part being painted black ; situated westward of Royan, and one cable from the edge of the cliff, it exhibits, at an elevation of 88 feet above the sea, a *fixed red* light, visible in clear weather 12 miles. A similar tower, painted in red and white horizontal bands, is situated north of Royan, and bears N.E. by E. $\frac{1}{4}$ E. from the Chay tower ; it exhibits, at an elevation of 177 feet above the sea, a *fixed red* light, visible in clear weather 14 miles.

These two lights are visible only through an arc of 10 to 12 degrees on either side of the line of direction.

Royan.—At 152 yards within the end of the jetty at Royan, a *fixed white* light is exhibited from a tower, at an elevation of 44 feet, and visible 9 miles.

Port St. George.—Two *fixed red* leading lights are shown, one from the top of a house on the south extreme of Valliere point, at the entrance of the little port of St. George, and the other, S. 47° E., about $1\frac{1}{2}$ miles to the south-east, from the top of a house on the hills of Sulzac. The light off Valliere point is elevated 46 feet, visible 12 miles through an arc of 15° , and that on the Sulzac hills 121 feet above high water, and visible at a distance of 17 miles.

Grave point.—The square tower on Grave point, the south point of entrance to the Gironde, exhibits, at an elevation of 85 feet above high water, a *white* light, *occulting* at intervals of *five seconds*.

St. Nicolas.—A square black tower on the downs of St. Nicolas, bearing W. $\frac{1}{4}$ S. from Pointe de Grave light-tower, exhibits, at an elevation of 71 feet above high water, a *fixed green* light, visible in clear weather 12 miles, through an arc of 24° .

LIGHTS in the RIVER.—A light-vessel, moored in $4\frac{1}{2}$ fathoms water, near the north-west end of the Tallais bank, $4\frac{1}{2}$ miles S.S.E. of Grave point, exhibits, at an elevation of 35 feet above the sea, a *fixed white* light, visible 11 miles. The vessel is coloured red, and carries a red ball at mast-head. In foggy weather a bell is sounded five times every half minute. *See fog signals, page 2.*

The Richard is a *fixed red* light, shown from a circular turret upon three legs, on the left or south-west bank of the river, 10 miles

above Grave point, and about 5 miles from the Tallais light-vessel. The light is elevated 105 feet above high water, and visible 16 miles.

Light-vessels.—Two light-vessels are moored farther up the river, off the left bank, one in 12 feet water, nearly abreast the Tour de By, the other, the Mapon, in 19 feet. They each exhibit, at elevations of 34 and 33 feet above the sea respectively, a *fixed white* light, visible at about 10 miles. The former vessel is black and red, in horizontal bands, the latter red.

In foggy weather a bell is sounded, from each of these light-vessels, five times every half minute. See fog signals, page 2

Calonge.—Near the entrance of Calonge canal a *fixed red* light is exhibited from an iron support, at an elevation of 22 feet, visible 4 miles.

Patiras isle.—On the north extreme of Patiras isle, in the middle of the river, is a square tower, about 5 miles above the Mapon light-vessel, from which is exhibited a *flashing white* light with eclipses every four seconds. The light is 69 feet above high water, and visible 13 miles.

Pauillic.—At the landing-place at Pauillic, on the left or western bank of the river, abreast Patiras isle, a *fixed white* light is shown, at an elevation of 23 feet, and visible 7 miles. The light shows *red* in the direction of St. Lambert.

On the quay at Pauillic a *fixed green* light is shown from an iron post, visible 4 miles.

Gaët.—At Gaët, half a mile north of Pauillac, is exhibited from an iron beacon a light which shows *white* through the greater portion of the horizon, but *red* towards Mousset light; it is elevated 20 feet above high water, and the *white* light is visible 7 miles, the *red* light 8 miles, in clear weather.

St. Lambert.—At St. Lambert, half a mile south of Pauillac, a *red* light is exhibited, visible 9 miles. This light in line with the light at the landing-place at Pauillic lead to the anchorage off that town.

Mousset and Blaye.—East of the village of Mousset, and one mile north of Gaët, on a square tower elevated 67 feet above high water, is a *fixed white* light, showing *red* towards Gaët. The *white* light is visible 7 miles, and the *red* light 8 miles. At port de Blaye, on the east bank of the river, about 5 miles above the north end of Patiras island, two lights are shown—one at the extremity of

the landing-place, *red*, visible 2 miles, and one on a wooden post, on the wall at the entrance of the port, elevated 16 feet above high water, a *fixed white* light, visible, in clear weather, 4 miles.

Plagne.—At Plagne harbour, on the right bank of Dordogne river, a *red* light is exhibited, visible 4 miles.

Pilots.—No large vessel should attempt to enter the Gironde without a pilot, on account of the shifting banks and the uncertainty of finding the buoys in their proper positions. The pilots are in general excellent seamen, and worthy of confidence. They will sometimes be met with 25 or 30 miles from the land. When they see that the entrance is impracticable, they run into the Pertuis d'Antioche or the Pertuis Breton.

Steam tugs are always ready, but it is not obligatory to employ them. The expense can be, and is, frequently avoided without loss of time, especially at spring tides.

Tides.—It is high water, full and change, at Cordouan lighthouse, at the entrance of the Gironde, at 3h. 55m.; ordinary springs rise $16\frac{3}{4}$ feet, neaps $10\frac{3}{4}$ feet—at Royan, at 3h. 58m.; rise $16\frac{3}{4}$ feet, and $10\frac{3}{4}$ feet—at Pauillac, about 25 miles within the entrance, at 5h. 20m.; rise $18\frac{1}{4}$ feet, and $11\frac{1}{2}$ feet—at Bordeaux, at 6h. 50m.; rise 18 feet, and $11\frac{1}{4}$ feet. Equinoctial tides rise 17 or 18 feet.

The tides, both ebb and flood, set strong through the channels at the entrance, and great caution is required when approaching the river in thick weather. They follow the direction of the Passe du Nord, and turn at $1\frac{1}{2}$ hours after high or low water, there being hardly any slack water. In the Passe du Sud, with Cordouan light-tower bearing N.E., they set as follows:—First of the flood, North; one-third flood, N.E.; half and two-thirds flood, E.N.E. First of the ebb, S.E.; one-third ebb, South; half and two-thirds, West. In the channel between the Cordouan bank and Grave point, the flood sets generally S.E.; the ebb from West to W.S.W.

The winds have a great influence on the tides; and in general, a favourable tide may be depended upon when the wind blows strongly into the river, and a low one with a strong wind blowing seaward.

Bore.—The Gironde is liable to a bore at high spring tides. The crest of it rises 13 to 16 feet above the surface of the river; and this great mass of water, moving along with impetuous velocity, often causes serious damage to vessels, not only in the Gironde, but in the Dordogne, which river it ascends for about 20 miles.

Anchorage.—The first anchorage in the Gironde is in front of Royan, on the north shore of the entrance. It is, however, exposed to seaward ; and often there is a heavy sea, which, in a weather tide causes vessels to ride uneasily.

The holding ground in Verdon roadstead, 2 miles within Grave point, is not good ; but as the anchorage, in 6 fathoms water, is easy to weigh from, vessels often use it in bad weather.

The Rade de Richard, 8 miles higher up the river, is securely sheltered, in $3\frac{1}{2}$ to 4 fathoms, muddy bottom.

PASSE du NORD,* on the northern side of the entrance, is about three-quarters of a mile wide between the buoys, and carries from 26 to 31 feet water by keeping Grand Banc light-vessel 3° open eastward of Cordouan lighthouse ; but the soundings within deepen in places to 15 fathoms. It is navigable for large vessels ; but as the channel is limited by sand-banks which shift their position, a stranger should not attempt it without a pilot. The channel is bounded on the northern side by the Demi bank and La Mauvaise shoal at entrance, and the Barre à l'Anglais a little within ; and on the southern side by Le Grand Banc and the Plateau de Cordouan.

Depth of water.—The Passe du Nord carries from 26 to 31 feet of water.

Demi bank and La Mauvaise shoal extend about $2\frac{1}{2}$ miles in a north-westerly direction from Coubre point lighthouse. There are 23 feet at low-water on La Mauvaise, with Grand Banc light-vessel in line with Cordouan lighthouse, and from $2\frac{3}{4}$ to $4\frac{1}{4}$ fathoms on Demi bank ; bordering the west side of Combres point, are some patches with from 3 to 9 feet, which are steep-to.

The Barre à l'Anglais runs north-westward $2\frac{1}{2}$ miles from Palmyre point ; there are 3 fathoms on its outer part, but towards the point it shoals to a dry bank.

Le Grand Banc, with numerous shallow patches of 9 feet to 3 fathoms water on them, the Monrevel shoal, and Cordouan plateau, lie to the south-east—fronting the mouth of the Gironde—for about 11 miles to the Passe du Sud. On the Monrevel shoal, $1\frac{1}{2}$ miles from Palmyre point, there are from $1\frac{1}{4}$ to $2\frac{1}{4}$ fathoms. From the Monrevel shoal the channel is clear up to the buoy of the Platin, at $1\frac{1}{2}$ miles northward of Grave point.

Buoys.—The Passe du Nord is indicated by the following buoys :—A large red buoy with automatic whistle is moored, in 10 fathoms, in

* Passe du Nord was re-surveyed in June 1887, but no material change was found to have taken place since the Survey in 1886.

the fairway outside the bar, with Coubre point lighthouse in one with the lighthouse on the downs of Palmyre, S.E. by E. $\frac{1}{2}$ E., distant $5\frac{1}{2}$ miles.

The western side of the Passe du Nord is marked by a red buoy, and on the eastern side there is a black buoy lighted by gas, and a black buoy which marks the north-west extremity of Mauvaise shoal.

The northern side of the channel within the bar is marked by six black buoys, two of which are on the outer edge of the patches off Coubre point; two others, about $1\frac{3}{4}$ miles from each other, on the outer edge of the Barre à l'Anglais; and two, about $1\frac{1}{4}$ miles apart, on the outside edge of the St. George bank.

The southern side of the channel within the bar is marked by four red buoys, three of which guard the Monreval shoal; and the fourth is on the north part of the bank off Grave point.*

PASSE du SUD (GRAVE), the southern entrance to the Gironde, is narrow and not so deep as the Passe du Nord, but it is occasionally preferred by vessels that cannot procure pilots, because its entrance is well marked by objects on the land. They must, however, be careful not to approach too near the Coast of Medoc in tacking, as the flood sets strong towards it.

The leading marks for the Passe du Sud are easily recognised; the outer ones are the light-towers of St. Nicolas and Pointe de Grave, and the inner ones the light-towers of Chay and Royan. The two first of these marks in line lead between the Chevrier bank, on the north-west side of the channel, and the Olives bank, extending from the shore on the south.

On the extremity of the Olives bank, $2\frac{3}{4}$ miles from the shore, the depth is only $2\frac{1}{2}$ fathoms, and within this distance there are several rocky patches with less than 6 feet water on them.

Depth of water.—Not more than 12 feet can be reckoned on in the channel at low water, and a vessel of large draught should not attempt its navigation except with a rising tide and fair wind. At all times, therefore, a preference should be given to Passe du Nord, as the depth is greater, and the ground in all parts good for anchorage.

* The black buoy lighted by gas is moored north-westward of Tête de la Mauvaise shoal; it is an experimental buoy, and mariners should not rely either on the illumination of the buoy or of its being in position. The south-east buoy of Banc de la Coubre is black with a white band.

Buoys.—The Passe du Sud is indicated by the following buoys:—The outer large fairway buoy is black and red in horizontal stripes with bell and reflector, moored in 9 fathoms water, distant about 5 miles from the land, with St. Nicolas light-tower bearing E. $\frac{1}{4}$ N. $8\frac{1}{4}$ miles, and Cordouan lighthouse N.E. by E. $\frac{1}{4}$ E. 6 miles.

On the south-west end of the Chevrier bank there is a black buoy, in $4\frac{1}{4}$ fathoms water, with Cordouan lighthouse bearing N.E. $\frac{1}{4}$ N., and Vieux Soulac beacon S.E. by E. $\frac{1}{2}$ E., and about $1\frac{1}{2}$ miles to the north-eastward of it is another black buoy.

On the extremity of the Olives bank is a red conical buoy, in $3\frac{3}{4}$ fathoms, with Cordouan lighthouse bearing N.E. by N. and Vieux Soulac beacon E.S.E.; and about $1\frac{1}{2}$ miles to the north-eastward of this latter buoy is another red buoy, with a conical cage, in $4\frac{1}{2}$ fathoms water.

A black buoy lies on the south-west part of Matte du Gros-terrier, with Cordouan lighthouse bearing N.N.W. and Point de Grave lighthouse E. $\frac{3}{4}$ S.

A red conical buoy lies on the St. Nicolas rock, abreast the St. Nicolas light-tower; a red buoy on the northern edge of the Platin shoal; and a white buoy on the Cordouan bank, about half a mile N.E. by E. of the Cordouan light-tower.

Directions for Passe du Nord.—Sailing vessels should not attempt to enter the Gironde when the weather is hazy and there is an appearance of a calm, because at such times a heavy swell frequently arises in an instant. This phenomenon, called by the pilots *Le Brume Sèche*, or the dry haze, is a sort of mist, accompanied by a calm, which is invariably followed by a swell in all the channels. Vessels should also be on their guard when approaching the entrance at night, as fog frequently obscures the lights.

To sail into the Gironde by the Passe du Nord, steer for the light-tower on Coubre point (*fixed white light*) in one with the Palmyre lighthouse (*alternate red and green light*), S.E. by E. $\frac{1}{2}$ E., which will lead about a quarter of a mile southward of the red fairway buoy, with whistle, moored outside the bar. Keep the Grand Banc light-vessel (two *fixed white lights*) 3° open eastward of Cordouan light-tower (*revolving white and red light*), so as to pass westward of La Mauvaise shoal, which is the leading mark for entering the channel. Having cleared La Mauvaise, the lights may be gradually brought in line, opening the light-vessel a little to the southward, and steering eastward towards the Terre Nègre light-tower (*fixed white light*) until the port St. George lighthouses (each a *fixed red light*) are

in line, bearing S.E., which is the mark to continue upon until the Talais light-vessel (*fixed white* light) and Richard light-tower (*fixed red*) are in one, which last is the leading mark up to the anchorage in Verdon road.

At night the same directions apply, attention being paid to the descriptions of the several lights, and in leaving the river, by reversing the order in which they are here placed.

River lights.—To facilitate the navigation, the following lights are established indicating the channel up the river :—on Grave point an *occulting* light ; Talais floating, *fixed white* light with fog bell ; Richard, *fixed red* ; Tour de By and Mapon floating, *fixed white* lights ; Calonge canal, *fixed red* ; Patiras isle, *flashing* light ; Mousset, Gaët, and Pauillac lights, on the east side of the river ; and two lights at port de Blaye.*

Directions for Passe du Sud (Grave).—To sail through this channel, bring the light-tower (*fixed green* light) on the downs of St. Nicolas in line with that on Pointe de Grave (*occulting light*), bearing E. $\frac{3}{4}$ N., and steer with these on until the Chay light-tower (*fixed red* light) and that of Royan (a *fixed white* light) are in line, bearing N.E. by E. $\frac{3}{4}$ E. ; proceed with these in line until the Talais floating light (*fixed white*) is in line with Richard light-tower (*fixed red* light) which is the leading mark up to the anchorage in Verdon road.

If these marks are followed, 12 feet will at least be carried over the shoalest parts at low-water springs ; but if they are departed from, there must not be a greater depth than 8 feet calculated upon.

In working through do not stand farther westward than to have St. Pierre de Royan church in line with the Chay light-tower ; nor farther towards the shore than to have the church but little open to the eastward of the tower, for the flood stream strikes with such force upon the coast that in many cases it will be almost impossible to keep the vessel thoroughly under command.

At night the above directions apply, attention being paid to the different descriptions of lights, bearing in mind that those of Chay, St. Pierre, and St. Nicolas are not visible more than 12° beyond the line of direction. When leaving the river, reverse the order in which they are here placed.

The coast from the Gironde river trends S.S.W. about 57 miles to the lighthouse of cape Ferret, northward of the entrance to the

* See page 123.

Bassin d'Arcachon, and consists throughout of low sandy downs with a few clusters of trees. About midway, a short distance inland, and parallel to the shore, are two remarkable lakes, the northern of which is named Etang de Carcans, the southern, Etang de Lacanau; they communicate with each other and with the Arcachon basin. On the downs, about 4 miles south-west of Etang de Lacanau, stands a beacon, called Balise de la Grigne.*

LIGHTS.—On the Hourtin downs, between the mouth of the Gironde and cape Ferret, 219 yards N.N.E. and S.S.W. from each other, are two square red towers, 77 feet high. They each exhibit, at 177 feet above high water, a *fixed white* light, visible in clear weather at a distance of 20 miles.

On cape Ferret, north side of the entrance to the Bassin d'Arcachon, is a round tower, which shows, at 167 feet above high water, a *fixed white* light, visible 19 miles.

BASSIN D'ARCACHON.—This extensive basin, although full of shoals, and its entrance nearly blocked by sand-banks, is much frequented, and about 60 vessels enter the port annually, representing an aggregate tonnage of nearly 4,700 tons, and the chief trade is in pit-wood and oysters. The fishing also is good, and gives employment to the inhabitants of the numerous villages along its shore.

The largest village, La Teste de Buch, is on the southern shore, and until 1854 consisted only of a few fishermen's huts; but the place being admirably adapted for sea bathing, and connected by railway, steam, and electric telegraph with other parts, there is now (1886) a population of over 8,000.

Good supplies, and also coal, may be obtained, and repairs may be done to vessels, for which purpose they are grounded on the sand, for there is no dock.

There is no hospital or home for sailors, and no special custom-house or quarantine regulations.

The basin is bordered by beautiful smooth sands, and encircled by sand downs covered with fir woods, which shelter it. The river Leyre falls into its south-east angle.

Arcachon is one of the most healthy resorts in Europe.

Depth of water.—The entrance to this basin is fronted by an extensive flat, through which are two channels, known only to the fishermen and pilots, who are found cruising off the port. The principal channel is from the southward, but its bar so frequently shifts that no chart can be depended on for any length of time; for

* See Admiralty chart:—France, west coast, sheet 1, No. 2,665; scale, $m = 0.5$ of an inch; also Bay of Biscay, No. 1,104; scale, $m = 0.07$ of an inch.

crossing it, two beacons, one of which is moveable, are erected on the shore ; from thence the narrow channel trends first to the south-east and then in a north-east direction, close to the eastern shore, and carries from $4\frac{3}{4}$ to 9 fathoms water.*

Anchorage.—There is anchorage off Moulo, $1\frac{1}{2}$ miles within cape Ferret, in 5 and 6 fathoms, sand ; but the only safe anchorage in the basin for large vessels is between Bernet point and the Teich channel, which is difficult of access, being separated from Moulo roadstead by a bank of fine sand, which frequently shifts.

When approaching from seaward, the position of the basin will be recognised by the circular brick light-tower on the north side of entrance, where the land is low, level, and destitute of trees ; whilst on the south the sand downs are somewhat higher and covered with trees. The breakers at the entrance may always be seen, and the soundings decrease gradually towards them ; but a heavy sea frequently breaks on the bar, rendering crossing occasionally impossible. The fishermen often prefer keeping at sea for days in rough weather rather than risk crossing the bar, and are frequently obliged to run for Rochefort or the Gironde.

Buoys.—The outer buoy (named Landing), entrance to Bassin d'Arcachon, is a red and black spiral buoy, moored in 13 fathoms, with the lighthouse north of cape Ferret bearing E. by N. $\frac{1}{4}$ N., and the semaphore at point d'Arcachon S.S.E. $\frac{3}{4}$ E.

Rastey buoy, conical, red and black, is moored one mile S.E. $\frac{1}{4}$ S. from landing buoy.

Tides.—It is high water, full and change, in the Bassin d'Arcachon (entrance) at 4h. 10m. ; springs rise $12\frac{3}{4}$ feet, neaps $9\frac{3}{4}$ feet. The tide is an hour earlier on the bar than in the basin, at Notre Dame chapel.

Life-boat.—A life-boat is stationed at Bassin d'Arcachon.

Coal may be obtained for steaming purposes at 27 francs per ton and 1,200 tons are usually kept in store. Vessels are coaled at the wharf, where there is 24 feet alongside at low water.

The coast from Arcachon basin trends in the same direction as before for 62 miles to Bayonne. The land between is low and level, excepting some little downs covered with trees, which appear to be elevated above the general level ; for a distance of about 20 miles

* Vessels of 25 feet draught can navigate the channel and enter the port at high water neaps, and vessels drawing 15 feet can do so at low water springs. The greatest draught of any vessel which has entered the port was 20 feet—1890.

northward from Bayonne they are from 120 to 170 feet in height, and extend about a mile inland, but their form is continually changing.

LIGHTS.—On the sand hill at Contis, between the Bassin d'Arcachon and the mouth of the Adour, is a round tower, which exhibits, at 164 feet above high water, a *revolving white* light, attaining its greatest brilliancy every *half minute*, and in clear weather should be seen from a distance of 19 miles. In ordinary weather the eclipses are not total within the distance of 10 miles.

Beacons.—At Biscarosse, about midway between the lighthouses of Arcachon and Contis, is a beacon, 62 feet high, with a black top. On the downs of Huchet, between Contis and Cape Breton, is another beacon, 75 feet high, formed by two triangles, one over the other,—the upper black, and the other white.

FOSSE de CAP BRETON.—The soundings between Arcachon and Bayonne are regular, sand, gravel, and shells, shoaling gradually from 30 fathoms at $5\frac{1}{2}$ miles off shore, to 10 fathoms at one mile, and 5 fathoms at half a mile, within which are occasional patches of 3 to 6 feet at low water; but 8 miles north of Bayonne, abreast Cape Breton, there is a singular pit or break in the soundings, with deep water, over mud bottom, from seaward nearly up to the beach. This is called the Fosse de Cap Breton, and its general direction is indicated by two beacons on the sand-hills abreast, which when in one bear about S.E. by E. $\frac{1}{4}$ E.*

At 6 miles from the shore it is about $1\frac{3}{4}$ miles wide and 172 fathoms deep; at $2\frac{3}{4}$ miles, three-quarters of a mile wide and 205 fathoms deep; at one mile, a third of a mile wide and 57 fathoms deep; at a quarter of a mile, half a mile wide and 17 fathoms deep; and 8 fathoms deep at less than 2 cables from the beach.

LIGHT.—On the south bank of the entrance to port Cape Breton, 95 yards from the extremity of the wall, a *fired red* light is exhibited at an elevation of 26 feet above high water, visible 4 miles.

The anchorage at the end of the Fosse is less dangerous than any other part of the coast in the neighbourhood of Bayonne, and it affords to vessels that may have to run on shore the best place in the neighbourhood of Bayonne.

* In the autumn the beacons are sometimes hidden in the early morning by mist, which disperses in mid-day, or if the wind is westerly.

To enter in bad weather, keep at least 5 miles from the shore till the beacons are in one; then run in with these marks on so as to avoid the tremendous sea which breaks on both sides of the Fosse. A vessel near the bar of Bayonne, and endeavouring to steer along shore towards the Fosse, would be in danger of being swamped in crossing the southern edge.

As port Cape Breton can only be entered by boats at two hours before or after high water, and then only with a smooth sea, it is not necessary to describe it.

The RIVER ADOUR,* the mouth of which is 8 miles to the south-west of Cape Breton, has its source in the mountain ridge of Tourmalet, in the department of Hautes Pyrenees. Its course is first North, then West, S.W., and S.S.W., passing St. Sever and Dax, to the former of which it is navigable, and falls into the sea at $3\frac{1}{2}$ miles below Bayonne. Its whole length is about 170 miles. The current is rapid; and sometimes serious inundations are caused by the melting of the snow on the Pyrenees, and a shifting bar at its mouth renders the passage in and out difficult, and sometimes dangerous, though the employment of steam tugs diminishes the risk. Jetties are built on either side of the river channel, from the entrance to within $1\frac{1}{2}$ miles of the town, and piers extend from both sides of the entrance over the bar, with a breadth between them of 170 yards.

The bar.—Vessels of from 12 to 13 feet draught can cross the bar at high water neaps, but at low water springs the bar cannot be crossed. (Bar signals, *see* pages 134 and 135.)

Depth of water.—Within the bar the soundings deepen, but they are very irregular, varying generally in the deep water channel from about $2\frac{1}{2}$ to 6 fathoms.

A vessel of 18 feet draught has entered the port of Bayonne, 1890.

BAYONNE stands on the left bank of the Adour, at the confluence of that river with the Nive. The latter divides the town into nearly two equal parts, called Great and Little Bayonne, connected by iron and stone bridges. Both parts are surrounded by ramparts, flanked with bastions and broad deep ditches, which at any time can be filled with water. Abreast Bayonne, on the right bank of the Adour, is the suburb St. Esprit, where, on an eminence, is the citadel, which commands with its formidable batteries the

* *See* Admiralty plan:—River Adour from its mouth to Bayonne, with bar and entrance. No. 1,343; scale, $m = 8$ inches.

town, both rivers, and the plain. The Adour is here about 250 yards in breadth and spanned by a stone bridge. The dockyard is commodious, and the arsenal of Bayonne is one of the best and most complete in France. The military hospital also is of considerable extent, being capable of accommodating 2,000 invalids. The foundry stands on the north side of the river, about one mile within the bar, and the three chimneys rising to the height of 205 feet above low water, serve to indicate the entrance of the river, and they are seen above the trees that fringe the coast; at night they may be distinguished owing to the smoke from them being lighted up.

The shipping trade, however, has been much injured since the connection of this port with the north of France, and, from the difficulties of the bar. The chief exports are resin, pine timbers, and wine, of aggregate annual value of about £46,400; the chief imports are coal, grain and fish, of the annual value of about £731,000. This port is frequented by about 880 vessels annually, representing about 187,200 tons. Coal, water, and provisions are plentiful, and small repairs can be carried out both to hull and machinery.

There is communication with other parts by steam and also by electric telegraph, and a railway to Bordeaux and other parts. There are no special Custom-house or quarantine regulations, and no diseases against which special precautions are necessary. There is no hospital or sailors' home, but sailors are admitted to the civil hospital at a charge of 1½ francs per day, and they receive every care and attention.

The population of Bayonne in 1886 was about 27,000.

LIGHTS.—A round brick tower, 144 feet high, stands on St. Martin point, 2½ miles south-west of the mouth of the Adour, and shows *alternately a white and red flash*, at intervals of *twenty seconds*. The light is elevated 240 feet above high water, and visible in clear weather at a distance of 22 miles.

A *fixed white* light is exhibited from the signal tower, close to the south jetty at the south side of entrance to the Adour, when vessels may enter the river; and a *fixed red* light when they are not to enter. The light is elevated 56 feet above high water, and in clear weather is visible 9 miles.

Leading Lights.—When the white light is shown, and the passage practicable, two *green* lights are exhibited in rear of the light at the signal tower, which kept in line, will lead in the direction of the channel between the jetties.

The western light is shifted as the bar changes.

Beacons.—Five small beacons or posts mark the outer edge of the shoal water, which extends from Saint Bernard bank.

Docks.—There is a small dry dock, 244 feet in length over all, 152 feet on the blocks, and 33 feet width of entrance, which can only be entered at spring tides, when there is about 10 feet of water over the sill. A vessel of 500 tons is the largest which has been admitted.

Coal.—The supply of coal is adequate to the demand, the price being about £1 per ton. Vessels are coaled by porters alongside the wharf, where there is about 17 feet at low water.

Harbour works.—A new dry dock is in course of construction.

Rifle range.—There is a rifle range on the north point of the entrance to the river.

Signals to vessels crossing the bar.—The signals are made from the signal tower, and from a flagstaff situated southward of the tower.*

To vessels that have arrived off the bar and are waiting to enter, signals are made from the top of the signal tower. These signals indicate :—(1) by balls the draught to be admitted at the time the signal is made ; and (2) by signal from Semaphore arm, the directions to be followed in steering into the port :—

Semaphore arm raised



Pilot will direct you by signal.

Semaphore arm inclined to the right.



Alter course to starboard.

Semaphore arm inclined to the left.



Alter course to port.

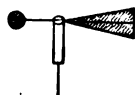
Semaphore arm turned down.



Vessel is out of danger.

* The signals are in charge of the chief pilot, and it is necessary that vessels should follow exactly the directions transmitted to them by the signals.

Semaphore with ball
attached to arm.



There is not enough water ; stand
off.

Semaphore with red flag
attached to arm.



Will direct you by signal where
to run aground in the best
place ; take precautions for
saving lives of the crew.

A black cross on the tower,
to seaward.

Vessels of 50 tons and less cannot
enter.

A red flag at the mast head
of the tower.

No vessel can enter.

To vessels in the offing the National flag at the flagstaff indicates
that the bar is practicable at high water.

This signal is made in conjunction with balls, according to the
system adopted at the French ports (*see* pages 4 and 5), and indicates
the maximum draught of the vessel which can be admitted at the
next high water.

When no signal is made the bar is impracticable.

Should a vessel require the assistance of the tug, she should hoist
the National flag at the main, keeping the signal flying until the
arrival of the tug.

A white flag with blue crosses at the gaff of the flagstaff—Tug will
raise steam and come out.

Two white flags with blue crosses at the gaff of the flagstaff—Tug
cannot come to you.

Three white flags with blue crosses, vertical—You cannot enter
without the assistance of the tug.*

To vessels in port, a chequered red and white flag on the tower
facing inland—Vessels may go out.

A flag, with blue crosses, on the tower facing inland—Steamers
only can go out.

The above two signals are repeated at the beacon tower of Boucant,
and at the mast on the bastion Alleés Marines, Bayonne.

NOTE.—Two vessels are not permitted to cross the bar at the same
time. Should two or more vessels require to enter, the signal will
be made to one only ; the second vessel is on no account to follow

* To be answered by the vessel (if the tug is required) by the National flag at the
main, indicating acceptance of the tug's services, when the three flags will be hauled
down, and one flag hoisted.

until the signal is made to her. Sailing vessels are strictly forbidden to enter at night. Vessels towed by the "Harbour tug" are permitted to enter at night in very urgent cases. Steamers may enter at night under exceptional circumstances only.

Tides.—It is high water, full and change, at Le Boucaut, river Adour, at 3h. 53m.; ordinary springs rise 9 feet, neaps $6\frac{1}{2}$ feet above level of soundings, which is about two-thirds of a foot below low water ordinary springs. Ordinary springs range $8\frac{1}{2}$ feet; neaps, $5\frac{1}{4}$ feet*. The time of high water is subject to variations from the duration, direction, and force of the winds which may have previously prevailed. In the narrows the ebb stream flows at the rate of 5 knots an hour, but above the old signal tower both flood and ebb seldom exceed 3 knots.

Directions.—Vessels bound to Bayonne from the westward, with the wind from that quarter, should endeavour to make the coast of Spain between cape Machichaco and St. Sebastian, particularly in the winter months; so that, should the weather become unsettled, and crossing the bar be attended with risk, they may enter either port Pasages or San Sebastian, in Spain, or St. Jean de Luz, in France, where they will be sure of obtaining pilots.

The Adour is subject to freshes, or a considerable increase of water, which strengthens the current of the river so much as to retard the flood-tide, and prevent its entrance. The stream under these circumstances always runs out, as may be found by the water of the river being met 3 miles or more outside. A vessel should not then attempt to enter the river, because the stream increases the danger of crossing the bar; nevertheless, if the wind be fresh, and the entering be not interdicted by signal, it may be attempted; but it will be necessary to carry all possible sail, and if the vessel be deeply laden, to have the hatches, boats, &c., well secured, as the sea on the bar is then dangerous: under these circumstances it is necessary to be ready to enter at least an hour and a half before high water.

Vessels entering in bad weather, with the wind aft and a heavy sea, should carry all sail they can bear. The fore and aft sails should be hoisted, particularly the jib and fore stay-sail, and the sheets hauled well aft. This precaution is indispensable; for if the sea broaches the vessel to, either way, the assistance of the head-sails is necessary

* See Admiralty plan:—River Adour from its mouth to Bayonne, with bar and entrance, No. 1,343: scale, $m = 8$ inches.

to regain the course. But if, from tempestuous weather, a vessel is not able to cross the bar, she should, if the wind permits, make for Port Passage, in Spain.

Care should be taken, when bound for the Adour, to keep the northward of the entrance, if the wind has previously prevailed from N.N.W. to East; but southward of it when the wind has prevailed for five or six days from South to N.N.W. Experience proves that in the former case the current sets to the S.W., and that vessels have sometimes been carried down to the coast of Spain; and in the latter, they have been drifted northward of the bar, where, finding no shelter, and being unable to keep off the land in bad weather, they have been stranded between the Adour and Vieux Boucaut.

When the wind is from N.N.W. to N.W., a vessel may steer directly for the mouth of the river, bearing in mind that St. Martin point light is $2\frac{1}{2}$ miles south-west of it. A vessel bound to the river, with the wind from the westward, and near the coast of Spain, and at such a distance as precludes the hope of entering before dark, should stand off and on under a sufficient press of sail, so as to counteract the effect of the current, which runs to the north-east, and at times at the rate of 4 or 5 miles an hour, when the wind has been blowing some days between W.N.W. and South. It will be prudent also to strive to keep an anchorage under the lee, into which she may run in the morning, in case the weather obliges her to seek for refuge.

The navigation of the Adour is not difficult after having passed the signal tower, but care must be taken to avoid the Casquets situated in the centre of the river abreast Le Boucaut, which are marked by two small towers.

Anchorage.—To the north of the Adour there is no anchorage in bad weather, not even in the Fosse of Cap Breton. A vessel may, however, run for a chance of saving her crew on the beach at the head of the Fosse, page 131, but to gain the entrance in bad weather it is necessary to work off about 6 miles from the coast. To the north and south of the Fosse, the sea breaks heavily on the sandy flats, where it is scarcely passable. There will be less danger in remaining at anchor outside the bar of the Adour, in 12 to 15 fathoms, sand and mud, N.W. a mile from the entrance, which is the best position to run in from, at the first favourable moment, and where the ebb tide assists a vessel off the land in the event of a change of wind; but this anchorage can only be considered as temporary, for at the least sign of bad weather a vessel should at once proceed to sea. It will be better, however, to endeavour, if possible, to seek refuge in St. Jean de Luz or Fuenterrabia.

THE COAST* from the Adour trends round to the S.W. and West for 15 miles to the entrance of the Bidassoa river, the boundary between France and Spain. The mountains of the Pyrenees, as well as those that branch off to the westward, are of considerable height, and will be seen a great distance seaward.

Biarritz.—At $2\frac{1}{2}$ miles from the Adour is St. Martin point with its lighthouse, and a mile farther on the little port and village of Biarritz, with a population, in 1886, of 8,452. This place is much frequented for the sake of its baths and the beautiful scenery in its vicinity. It has communication by railway and by electric telegraph to all parts of the continent.

Bidart.—At $2\frac{3}{4}$ miles south-west of Biarritz is Bidart village, standing a quarter of a mile northward of a rivulet.

Plateau de St. Jean de Luz.—From thence the coast consists in general of low rocks, with a few patches of sandy beach; but the country inland is high. This part of the coast is fronted by the Plateau de St. Jean de Luz, with varying depths on it of from 6 to 35 fathoms, rocky bottom, for which the mariner is referred to the chart. A vessel has nothing to fear in crossing this bank when the water is smooth, but the sea breaks heavily on eleven shallow parts in bad weather, and the shore should not be approached too close, and with great caution.

Mount Jaisquivel.—The summit of mount Jaisquivel, or Santa Barbara (this summit is known to the fishermen of Socoa as the Peruda), open west of cape Higuera, leads outside the plateau.

Anchorage.—In fine weather there is anchorage at a mile from the shore, in 12 or 13 fathoms water, fine sand and mud, with the village of Biarritz bearing E.S.E.; it is, however, only suitable for fishing boats, and should be used only by those well acquainted with the locality.

St. JEAN de LUZ BAY, which nature has made the most beautiful on the western coast of France, is situated 10 miles south-west of the Adour, it is three-quarters of a mile wide and a half mile deep, and affords anchorage in 3 to 6 fathoms water, sand and rock. The bay was formerly noted as much for its bad nautical qualities as for its natural beauty, for in the early part of the present century as many as 40 vessels were lost in a gale of wind, and a sloop of war anchored under Artha rock was wrecked like a canoe. Not only did mariners dread St. Jean de Luz, but the inhabitants were alarmed, as

See Admiralty chart :—Bidassoa river to cape Peñas, No. 2,728 ; scale, $m = 0.2$ of an inch.

the increasing erosion of the sea shore threatened the ruin of their dwellings. The construction of the mole, about 20 feet above the sea, extending from Socoa across the bay to the eastward,* and the break-water in course of construction over Artha rock, have almost put an end to the latter fears, and the bay is now a shelter for vessels which cannot enter the Adour, and its importance in this respect will increase as the engineering works for the improvements of the anchorage progress.

Artha rock lies nearly mid-way between Fort Socoa and St. Barbe point, and over which the sea breaks heavily in bad weather.†

The river Nivelle falls into the head of the bay, between two quays, 30 yards apart, and at its mouth, on the right bank, is the town of St. Jean de Luz, which is connected to its suburb, Siboure, on the left bank, by a bridge. The bar at the entrance to the river dries 2 feet at springs, at which period there are not more than 3 feet between the quays. The trade is small.

St. Barbe point, the eastern point of the bay, has a battery on it, and on the rocks at the extreme of the point there is a landing place. These rocks extend more than a cable west, and 2 cables south from the point, and dry at low water, making a close approach to this side of the bay dangerous. Half a mile N. by E. of the point are two patches of $2\frac{1}{2}$ and $3\frac{1}{4}$ fathoms, named Les Esquilletac, close outside which the depths are 8 and 9 fathoms.

Socoa.—The western point of the bay is also rocky. Here is the little tidal harbour of Socoa, enclosed within piers, and protected by a fort, but it dries at springs as far as the north jetty.

Depth of water.—St. Jean de Luz bay affords anchorage in 3 to 6 fathoms sand and rock. The bar of the river Nivelle dries 2 feet at springs, at which period there are not more than 3 feet between the quays. The harbour of Socoa is tidal; with a smooth sea it will admit vessels of $11\frac{1}{2}$ feet draught at springs and $8\frac{1}{2}$ at neaps, and with W. or N.W. winds the tide rises a foot higher.

A life-boat is stationed at Socoa.

LIGHTS.—At Socoa, on the west side of St. Jean de Luz bay, is a square tower painted with vertical black bands seaward, from which is shown a *fixed white* light, at 115 feet above high water, and visible at a distance of 10 miles; through an arc of $17\frac{1}{2}$ degrees this light shows *red*, indicating the point where the leading mark of

* There is a fog bell on the extreme end of the mole.

† See Admiralty plan :—St. Jean de Luz bay, No. 1,345; scale, $m = 9.3$ inches

the two *green* lights, shown from the head of the bay, terminates, being the position to turn to starboard for the anchorage.

On St. Barbe point are two *fixed red* lights, 411 yards apart, and bearing from each other S.E. by E. $\frac{1}{2}$ E. and N.W. by W. $\frac{1}{2}$ W., which, during the day, serve as leading marks. These lights attain their greatest brilliancy when in line, diminishing their brightness in proportion as that line is receded from, and are only visible through an arc of about 15° on each side of that line of direction.

The high light is elevated 33 feet above the ground, and 164 feet above the level of high water, and should be visible in clear weather from a distance of 19 miles.

The low light is elevated 10 feet above the ground, and 95 feet above the level of high water, and should be visible in clear weather from a distance of 15 miles.

At the head of the bay is a stone tower, which shows, at an elevation of 52 feet above high water, a *fixed green* light, visible 15 degrees on each side of the leading marks to the anchorage, visible in clear weather 11 miles. On the jetty, N. by W. 500 yards from the preceding, is shown another *fixed green* light, which, in line with the first, is the leading mark to the anchorage. These lights are visible through an arc of 15° on each side of the leading mark.

Signals.—A red or tricoloured flag indicates that a vessel can enter the port; when it is hauled down, and a flag hoisted on the end of the jetty, the vessel should anchor.

Tides.—It is high water, full and change, at Socoa, in St. Jean de Luz bay at 3h. 19m.; springs rise $12\frac{1}{4}$ feet, neaps 8 feet.

At St. Jean Luz it is high water, full and change, at 3h. 6m.; springs rise 13 feet, neaps $9\frac{1}{4}$ feet.

Directions.—A vessel's position can be ascertained by cross-bearing of the two mountains, Larhune and Batallera. Mount Larhune, bearing S. $\frac{1}{4}$ E., $5\frac{1}{2}$ miles from fort Socoa on the west point of entrance to the bay, is lofty and sharp pointed, and has a hermitage on its summit, but when bearing from S.S.E. to S.S.W. it presents a level ridge from the summit to the S.E., which seems to be prolonged when it bears west of S.S.W., and many ridges will be seen much farther inland. Mount Batallera, bearing S.W. by W. $8\frac{1}{2}$ miles from fort Socoa, is high and broad, and, when viewed in the above direction, appears like a crown, set round with a number of small peaks on its summit; when bearing west of S.S.W. it loses this appearance and presents only three irregular peaks.

St. Jean de Luz bay is known by the light-tower, and having made it out, steer in midway between Socoa mole and Artha breakwater. The steeple of St. Jean de Luz bearing S.S.E. $\frac{1}{2}$ E., leads through the west channel between Artha breakwater and Socoa mole. Having passed Socoa, haul gradually to the south-west, and steer towards a ruined windmill, situated to the right of the house Marie Bernetania, which will lead to the anchorage. Small vessels pass between the Artha and the east point of entrance, but they must be careful to give a good berth to the rocks extending from the point.

When approaching St. Jean de Luz with a fresh sea breeze the mariner should bear in mind that the wind very often falls completely when nearing the bay, and sailing vessels are in danger of being swept by the currents on the shoals and breakers outside. If there is much sea on vessels should not enter the roadstead at low tide, as it is then impossible for the tug to leave the port of Socoa, but under ordinary circumstances they will receive every assistance to enable them to proceed to the anchorage.

Anchorage.—Vessels should secure to the moorings unless the weather is very fine; the use of the moorings may be obtained at the cost of a few francs. Vessels using their own ground tackle, moor with the starboard anchor to the northward, and the port anchor to the south-west, with a hawser to steady them, but the holding ground is bad, the bottom being rocky under a layer of sand and mud. The usual anchorage is midway between fort Socoa and the entrance to the Neville, in 3 or 4 fathoms. There are seven mooring buoys in the bay.

If the sea is not too heavy, vessels that are unable to enter the Adour, will be able to reach the tidal harbour of Socoa, but the vessel's draught and the state of the tide should be considered, as it is necessary to avoid being at the entrance before half-tide. The pilot boats can leave at a quarter tide.

At night.—Entering St. Jean de Luz bay by night, bring Socoa *fixed white* light to bear S.S.E., and steer for it; when the two *fixed red* lights on St. Barbe point are in line, alter course and keep them so until the two *fixed green* lights at Siboure are in line; this last course leads between Socoa mole and Artha breakwater; when Socoa light has changed from *white* to *red*, haul to the south-west for the anchorage.*

* Vessels anchored at St. Jean de Luz can telegraph to the Harbour Office at Bayonne for information as to whether they can enter the Adour.

CHAPTER IV.

COAST OF SPAIN.—FUENTERRABIA TO CAPE PEÑAS.

VARIATION in 1891.

Fuenterrabia Bay - $16^{\circ} 25' \text{ W.}$ | Cape Peñas - $18^{\circ} 25' \text{ W.}$

THE province of Guipúscoa is bounded on the east by the river Bidasoa, and terminates on the west at Santurraran point.* It contains only about 30 miles of a rocky, broken, but generally clear, coast, which trends nearly in an east and west direction, with some slight inflexions to the south. Its capital, San Sebastian, is of some commercial importance. The ports of the province are few and insecure, except Pasages, which alone deserves the name. Visited as the coast of this province is in winter by strong north-westerly gales, the utmost caution is necessary by the navigator, for if the small ports are missed nothing awaits a vessel but a lee shore and probable destruction. For this reason every endeavour should be made to enter port Pasages when running for refuge in a north-west gale, and when neither Santander nor Santoña can be reached.

To avoid disaster, the necessity of navigating near the coast is strongly recommended, with a view of being able to recognize the land distinctly for the purpose of determining the position of the vessel, as it is more or less obscured during north-west and south-west gales. Should it be necessary to stand off the land to wait for daylight, as much sail as possible should be carried, so as not to lose ground, for, with the wind hanging steadily to the north-west, the vessel will drift towards the head of the bay. When waiting for daylight during winter, with a view of entering a harbour, and high water being from 9h. to 11h. am., a vessel should be in with the coast at daylight, so as not to lose the opportunity of entering.

Navigability.—Vessels of 15 or 16 feet draught can enter port Pasages.

Currents.—The navigator must bear in mind that the currents are stronger in proportion as the head of the bay of Biscay is approached, and there they turn to the north-east and north along the French coast. With a north-west gale they are said to run 4 miles an hour, and the local pilots consider that they occasionally attain 5 miles. The strength of the current during the gales of

* See Admiralty chart :—Bidasoa river to Cape Peñas, No. 2,728 ; scale, $m = 0.2$ of an inch.

winter, which always haul to the N.W. quarter, accounts for the many losses on the banks of Arcachon and Cap Breton. In summer, and during north-east and south-east winds, the current generally sets West and W.N.W., from one to 2 miles an hour.

Galernas is a name applied to those sudden changes of wind to the south or the north-west which blow strong and are common on the coast of this province and that of Vizcaya or Biscay. They generally occur in the months of July, August, and September, after a prevalence of hot southerly winds. It is seldom after a day of excessive heat that a galerna does not blow in the evening, the greatest strength of which will last from ten minutes to half an hour. Sometimes the galerna comes on with the strength of a hurricane without any warning. Many of the wrecks on the coast of Guipúscoa, in summer, are occasioned by the sudden changes of wind which overtake vessels with all sails set in a calm.

FUENTERRABIA BAY, situated 4 miles westward of Socoa, is the most easterly port on the north coast of Spain. At its head is the entrance of the river Bidassoa, a narrow winding stream, which forms the boundary between France and Spain, and the villages of Fuenterrabia and Hendaye—the former, with its fortress, belonging to Spain, and the latter to France.* $2\frac{1}{2}$ miles higher up is the town of Irun, the first town on the Spanish frontier, which stands on the southern slope of mount Jaisquivel, and the road to France passes through it. Near it, in the middle of the stream, is the ile de Faisans or Pheasants, covered with vegetation, but scarcely above water.

Fuenterrabia bay is $1\frac{1}{2}$ miles wide at the entrance, but not more than three-quarters of a mile deep, for at that distance within is the bar of the Bidassoa, which dries at the lowest tides. The river is shallow, and will only admit coasters, which load timber and iron ore for Ferrol. Fuenterrabia, on the western shore of the inlet, about $1\frac{1}{2}$ miles within cape Higuera, was formerly of considerable strength, but now a miserable dilapidated place. The inhabitants are chiefly occupied in fishing. The salmon of the Bidassoa are much esteemed.

Cape Higuera (Higuer), the western point of the bay, on which stands the lighthouse, is rocky, and surrounded by reefs which uncover at low water. The rocky islet of Amuck lies about one

* Beacons and pyramids have been erected on the shores of Fuenterrabia bay, to indicate the limits of the French and Spanish jurisdictions. *Paris Annonce Hydrographique*, No. 91 of 1880.

cable north of the cape, is of moderate height, and connected to the shore by a reef which dries at low water. A reef also extends northward from the islet, and it should not be approached too close. St. Anne point, the east extreme of the bay, has close to its west side two round rocks resembling towers, and others of a smaller size lie off its north and north-east sides; these are connected to each other and to the shore by a ledge which dries at low water.*

Depth of water.—The bar of the river Bidassoa dries 2 to 3 feet at the lowest tides.

Briquets reef.—At 4 cables E.N.E. of St. Anne point is La Roche Noire (Black Rock), 3 feet above high water springs; and three-quarters of a mile N.N.E. of the point is a dangerous reef named the Briquets. This reef, half a mile in extent N.W. $\frac{1}{2}$ W. and S.E. $\frac{1}{2}$ E., is narrow, has rocky heads which dry 2 to 6 feet at low water, and soundings of 3 to 7 fathoms close round it, which rapidly increase seaward, the depth being 17 fathoms at less than three-quarters of a mile distant.

LIGHT.—From the lighthouse on cape Higuera (Higuer), the west point of Fuenterrabia bay, is exhibited, at an elevation of 197 feet above high water, a *revolving red* light, eclipsed at alternate intervals of *ten* and *fifty* seconds. The light is visible between the bearings of S. 84° E. and N. 10° E., and should be seen in clear weather from the distance of 20 miles. The lighthouse is gray, with a white lantern.

Aspect.—Fuenterrabia bay will be recognised by the high land immediately westward of it, which, beginning at cape Higuera, gradually increases in altitude, until about 4 miles from the cape it rises to mount Jaisquivel, called also Olearzú (or Shoulder of the Mountain, in allusion to its being the last of the Pyrenees towards the sea coast), which reaches 1,665 feet above the sea. It has various inequalities on its summit, and the coast at its base is barren, and in places formed of cliffs. The mountains Larrun, or Larhune, and Batellera, 6 miles inland, are also good distinguishing marks for the bay.

Directions.—Approaching from the eastward, give St. Anne point a berth of $1\frac{1}{2}$ miles to avoid the Briquets reef. Amuck isle, W. $\frac{1}{2}$ N., leads north of the reef; and St. Anne point South, or Fuenterrabia church S.W. $\frac{3}{4}$ W., leads westward. Both these marks lead rather close to the reef. There are $2\frac{1}{2}$ to 7 fathoms water between the reef and the Roche Noire, but no vessel should attempt

* See Admiralty chart:—Bidassoa River to Pointe D'Arcachon, No. 2,665; scale, $m = 0.5$ inches, also Bay of Biscay No. 1,104, scale, $m = 0.07$ of an inch.

this passage, for it is always safer to pass outside. With the exception of a rocky patch, with 23 feet water on it, in the middle of the bay, the bottom is clear, and the depths gradually decrease towards the river. Give the shore of the cape a berth of a quarter of a mile in passing.

Anchorage.—Vessels will be sheltered from strong south-west winds on the west side of the bay. The best berth is from 2 to 3 cables E.S.E. or S.E. by E. of the fort or castle—which stands on the cliff about 3 cables south of Amuck islet—in from $6\frac{1}{2}$ to 8 fathoms water, muddy sand and good holding ground. Small vessels anchor farther in. During strong north-west winds this anchorage should not be used, particularly in winter, because if the wind veers to north or N.N.E. a vessel would have no shelter, and none but small vessels could run for Fuenterrabia, and then only at high water.

Tides.—It is high water, full and change, at Fuenterrabia, at 3h. 15m.; and the rise 12 or 13 feet. The ebb at springs runs out 3 miles an hour.

Winds.—The prevailing winds in this locality in winter are from south-west and north-east, generally with rain. In summer, gales from east and north-east with clear weather are frequent. The currents generally follow the direction of the wind.

PORT PASAGES.— $3\frac{1}{4}$ miles westward of cape Higuera is Turrulla point, projecting a short distance from the foot of mount Jaisquivel; the shore between is rocky, with one small sandy beach. Thence a steep rocky coast trends W.S.W. $3\frac{1}{4}$ miles to the entrance of port Pasages, which is a narrow but safe inlet formed by high steep shores. From the entrance it extends in a southerly direction about half a mile to the town of San Pedro, it then expands into an extensive basin, which dries at low water. There are 13 fathoms at the entrance, and the depths gradually decrease in a narrow gut to 3 fathoms off the town.*

The land on either side of the entrance is rugged and from 450 to 550 feet high, but the two points are low, rocky, and project respectively W. by N. and E. by S., thereby narrowing the channel to 180 yards. The eastern point is named Great Arando, the western point, Little Arando or cape La Plata; at high water a part of each point is covered, and the entrance appears larger than it really is.

* See Admiralty chart:—North coast of Spain, Bidassoa River to Cape Peñas, No. 2,728; scale, $m = 0.2$ of an inch; and plan of port Pasages, No. 73: scale, $m = 13.7$ inches; also Bay of Biscay, No. 1,104; scale, $m = 0.07$ inches.

S.O. 10809.

Within the entrance the shores are craggy and rugged; the eastern shore is fringed with rocks, some of which are uncovered; the western is clearer for $1\frac{1}{2}$ cables within the point, but from thence to Cruces point (with an iron cross on it) it is bordered by a rocky shoal, named Los Sepes. Many of the rocks on this shoal are uncovered at low water, and between them there are from one to 3 fathoms water. From the eastern extreme of the shoal Cruces point bears S.S.W., distant about 30 yards.

Cruces point derives its name from the mount from which it projects. The mount is called Cruces because at about one-fourth up there were formerly several iron crosses, some of which yet remain. One cable within Cruces point, on the opposite shore, is Santa Isabel castle, built at the foot of a hill close to the water.

The town is built at the foot of the hills on both shores of the arms. The barrio or district of the town on the western shore is named the pasages de San Pedro, commonly pasages de España: and the inhabitants mostly follow the fishery. The barrio on the opposite shore is named the pasages de San Juan, or pasages de Francia, and is larger than the former. Communication with each other is kept up by boats. The population in 1886 was 3,000.

About 75,000 tons of coal are imported annually, and a large quantity of wine is exported. In 1886, 679 vessels entered the port, representing an aggregate tonnage of 205,082 tons.

There is no regular railway communication with France or towns in Spain, but steamers proceed to Rouen and Antwerp. At present there are no docks, but there is a foundry for the repair of ships and machinery. The capabilities of the Government dockyard are unknown. Provisions are easily procured. There is no hospital or home for sailors, and no special quarantine or custom-house regulations. Extensive harbour works are in progress by a private company.

Anchorage.—From Santa Isabel castle to the high round tower of San Sebastian, standing close to the water, nearly $2\frac{1}{2}$ cables farther in on the opposite shore, is the usual anchorage in $3\frac{1}{2}$ to 4 fathoms water for vessels of more than 10 feet draught. The channel here is 120 yards across, and within the harbour widens out into an eastern and western arm, but it can only be used for small vessels, as it dries at low water.*

East and West banks.—Outside the harbour are two rocky patches, one named East bank, lying E.N.E. one cable from the east

* It is reported that a channel, capable of admitting vessels of 16 feet draught, has been dredged between the custom house and the western part of the bay.

point of entrance ; and the other, West bank, lying N. $\frac{3}{4}$ E. one cable from the west point.

The East bank, not more than half a cable long, has from 3 to 10 feet over it, $3\frac{1}{2}$ to $6\frac{1}{2}$ fathoms between it and the shore, the channel being a quarter of a cable wide, and 10 fathoms close-to on its north side.

The West bank is of sharp pointed rocks, with 6 feet over it, 6 fathoms close-to, and 6 to 9 fathoms between it and the land.

To clear the West bank, coming from the westward, it will be sufficient to keep 2 cables from the shore in approaching port Pasages, and not stand southward until the chapel of Santa Ana is open of Cruces point.

To clear the East bank coming from the eastward, keep rather more than a cable from the shore, until Great Arando point bears S.S.W. or the mouth of the port is open.

The sea breaks on both these banks when there is any swell.

LIGHT.—The lighthouse on cape La Plata, close to the west point of entrance to port Pasages, exhibits at an elevation of 484 feet above high water a *fixed white* light, visible in clear weather from a distance of 10 miles.

Harbour Lights.—The southern light, shown from San Sebastian (San Pedro) tower on the western side of the port, is a *fixed red* light.

The northern light, shown from the north point of Bonanza mole on the eastern side of the port, is a *fixed green* light ; it bears N. by E. $\frac{3}{4}$ E. from the red light, distant about 180 yards.

These lights, shown from iron supports about 15 feet high, should be visible in clear weather from a distance of 6 miles.

Signals.—In order to avoid accidents to vessels entering or leaving port Pasages, the following signals have been established :—

1. On a vessel entering the port, a black ball will be hoisted on the signal mast at the Vigia (situated on the cliff about 280 yards due East of Great Arando point, eastern side of entrance to the port), and a Spanish ensign on the mast on Ancho mole. These signals indicate that vessels about to leave the port, must not proceed until the vessel entering has passed the point of San Sebastian (San Pedro) tower.

2. On a vessel leaving the port, a Spanish ensign and blue flag will be hoisted on the mast on Ancho mole ; this signal will be repeated at the Vigia, by hoisting a black ball at the yard arm of the signal mast. This signal indicates that vessels making the port should not attempt to enter, until the vessel which is leaving shall be outside the entrance points.

3. Should the entrance channel from any cause be accidentally obstructed, a black ball and blue pendant will be hoisted at the yard arm of the signal mast on the Vigia, in order that vessels, both outside and in the port, may be apprised.

Pilots.—At port Pasages and the other harbours on this coast, the activity of the native seamen alleviate the dangers considerably, being ready with their boats in piloting and towing vessels into them. Here and at San Sebastian the regulations ordain that the first boat reaching the vessel must be employed, and then those in the order in which they come alongside. Both men and boats are well qualified for towing, mooring, or warping. In bad weather when they cannot venture out, a lookout man is stationed on the heights near the mouth of the harbour to signalize the approach of vessels, and if necessary a gun is fired to command attention.

When the sea is so heavy as to prevent the pilot boats from going outside the mouth of the port, they remain under the lee of Little Arando point, and signalize to the vessel with a piece of cloth or handkerchief on a staff, which is pointed in the direction the vessel is to steer, or held upright if she is to keep her course, and the pilot boards directly she is within the points. It is compulsory for all classes of merchant vessels to pay pilotage. Those under 50 tons pay 58 reals; from 50 to 100 tons, 144 reals; under 200 tons, 196 reals; and those above, 220 reals. Boats used are paid for besides the pilots, according to a tariff; and in bad weather vessels may depend on a supply of anchors, cables, hawsers, &c.

Life-boat.—There is a life-boat at port Pasages.

Coal.—From 3,000 to 4,000 tons of coal are kept in store, at 16 shillings per ton, and any steamer under 2,500 tons can load or discharge at the quays, where there is a depth of 20 feet at low water.

Tides.—It is high water, full and change, at port Pasages, at 3h. 20m.; springs rise 11 feet, and neaps 9 feet. The ebb runs 2 miles an hour.

Directions.—The entrance to port Pasages from the eastward may be ascertained by a bearing of mount Jaisquivel, the west slope of which extends to the entrance. From the westward it may be recognized by the lighthouse at San Sebastian and castle of La Mota, and when 2 or 3 miles northward of this port the lighthouse at cape La Plata will be seen, which is conspicuous from its whiteness, but if close in shore it will be shut in with the land. From the offing, when the lighthouse cannot be distinguished, mount Ordaburo,

which rises about S. by W. $5\frac{1}{2}$ miles from it, is a good mark; and also the mountains of Jaisquivel and Batallera to the eastward; mounts Urgull and Frio, with the buildings on them, to the westward; and finally, the natural opening formed by the port, which when it bears South or S.S.W. may be run for.

A sailing vessel entering the harbour should have a fair fresh wind and a flood tide. A moderate wind outside generally dies away when between Cruces point and Isabel castle, but the tide added to the ship's way, with boats to assist, will keep her clear of danger. The sea also should be moderate, for with a heavy swell outside, the water is so disturbed in the harbour as to prevent the vessel's steerage. The wind from W.N.W., round by north, to E.N.E. is fair for entering. Other winds are apt to take the vessel aback in the windings of the channel, which is too narrow to admit of tacking. With light airs vessels anchor at the entrance, and are warped or towed in by the native boats with the flood tide.

The worst wind for entering is from the West, for although between the entrance and Cruces point it draws to the north-west, yet within this point it veers to the south-west with squalls, placing a vessel in danger, as this is the narrowest part of the harbour. When bound therefore to this port from the westward, with a West wind and bad weather, if possible run into San Sebastian and wait for a change, or if sufficiently to the westward find shelter in Guetaria bay, 9 miles west of San Sebastian, the anchorage there being safe and easily taken.

Steering for the harbour, the first buildings seen will be the castle of Santa Isabel, and about a quarter of a mile within it, on the same shore, the chapel or hermitage of Santa Ana. When about a quarter of a mile from the entrance, the hermitage, with the breastwork at its base open of the iron cross on Cruces point, or the extreme of this point on with the west angle of Santa Isabel castle, will lead to the entrance. When within the points, keep towards the eastern shore to avoid the shoal off Cruces point, until the tower of San Sebastian appears midway between Isabel castle and the above point, when steer towards the tower, keeping mid-channel in the deepest water.

Having passed the castle, bring up with a stern anchor in $3\frac{1}{2}$ to 4 fathoms, and run a stout hawser out from each bow to rocks on shore bored through for the purpose. At high water there will be room for the vessel to swing, when moor head and stern, especially in winter, when a sea sets in, and whirling gusts of wind rush down through the breaks in the hills around the harbour. The bottom is mud, and should a vessel's stern touch in swinging, no injury is

likely to occur. Small vessels may go farther in and lie secure in all weathers. Steam vessels, from their facility in being able to enter at any time, will find Pasages an excellent port to seek from stress of weather.

Depth of Water.—Should the weather be thick or foggy, the approach to the harbour is well indicated by the soundings, as at 10 miles northward of the entrance the depths vary from about 70 to 75 fathoms, gradually decreasing until within 2 miles of the land, then 30 and 25 fathoms, in some places on a rocky and in others on a sandy bottom.

Coast.—Arando Chico or Little Arando, the western point of entrance to port Pasages, is low and of rock, but commanded by rugged land, 460 feet high, named cape Le Plata, and by the fishermen Espejo de Pasages.

At $1\frac{1}{4}$ miles westward is Talayero or Atalaya point, which is steep; and N.N.W. $\frac{1}{2}$ W. from it is the Pequechillá rock, with 3 feet water over it at low springs, and on which the sea breaks when there is a little swell. In case of necessity, coasting vessels may run between this rock and the land.

At half a mile farther westward is Mompas point. The coast between this point and Arando Chico, high and rugged, is the northern brow of the Sierra de Mirall, generally known as mount Ulia.

Mompas point is low and rocky, and falls in declivities from the high land forming part of mount Ulia, and on the height commanding the point there is a look-out house. Nearly a mile W. by S. $\frac{3}{4}$ S. from it is the north-east point of mount Urgull, and between is the bay of Zurriola, receding to the south-east. It is strewn with rocks and reefs, and partly covered by a wide sandy shore, which dries out considerably at low water. The little river of Urumea runs into the head of the bay. Its bar is dry at low water, and only at high water and during fine weather can boats pass over it when they can go up to the town of Astigarraya. A wooden bridge crosses the river near the bar.

SAN SEBASTIAN.—The position of this town may be easily known by mount Urgull or Orgullo, which is connected with the mainland by a low sandy isthmus, on which, at the foot of the mount, is the town of San Sebastian, the capital of the province of Guipúscoa.

The town is strongly fortified, being defended by out-works on nearly all sides, and commanded by the castle of Santa Cruz de la Mota, 492 feet above the sea. The population in 1886 was 21,000. From 40 to 50 vessels enter the port annually, representing an

aggregate tonnage of from 12,000 to 15,000 tons. The imports consist of Colonial produce and general goods ; the exports, manufactured goods for Spanish towns.

There is no regular line of steamers to other ports, but there is railway communication with France and Spanish towns ; there is also telegraphic communication.

There is no special hospital for sailors, but all foreigners are admitted to the general hospital. There are no special quarantine or Custom-house regulations, and no facilities for the gross repairs of vessels.*

A square tower stands on the north-west side of the mount ; it is white, and, contrasting with the dark background, is seen at a great distance. The cliffs of mount Urgull are more conspicuous than those of mount Chubillo on the west, and the large patches of whitish rock of which they are composed are also seen at some distance. At the foot of the mount foul ground extends nearly three-quarters of a cable in a north-west and northerly direction.

Mount Igueldo, on the west side of San Sebastian, terminates to the eastward in a hill, 623 feet above the sea, and with a slope of 45° to the north. This height is called mount Chubillo, and on its summit is an old tower, formerly used as a lighthouse, and an excellent mark for the bay ; the present lighthouse is on the northern slope of the same height.

Arrubia rock lies a quarter of a cable N.E. from point Arricobajo, the north-east extremity of mount Igueldo.

Santa Clara islet.—Between the above hills is the rocky islet of Santa Clara, 174 feet high, and about 2 cables in length, W. by S. and E. by N. ; and on its summit is a lighthouse. The islet is clear of danger on its south side, where there is a small mole, foul on the north, and nearly connected with mount Chubillo by a reef, which uncovers at low water, and on which some stones, formerly deposited to form a port, still remain.

San Sebastian bay, between the mounts Chubillo and Urgull, recedes to the south-east, is about half a mile deep, and surrounded by a white sandy beach, of some extent at low water. Vessels which cannot enter the basin anchor under the limited shelter of Santa Clara, but where they are exposed to gales from N.W. to N.E., for the sea which sets in east and west off the islet is occasionally so heavy as to occasion the loss of vessels and their crews.

* See Admiralty plan :—Port and town of San Sebastian, No. 88 ; scale, $m = 14.4$ inches.

The bay is not adapted in winter for vessels which cannot enter the basin, nor should those in the basin go into the bay if there is any likelihood of a north-west gale, as the little safety it then affords, the impossibility of entering the basin again, and the difficulties to be overcome in getting well secured in time, are reasons for not doing so.

The basin is formed by two piers extending westward from the town, and two others running eastward from the foot of mount Urgull, which overlap the former, leaving a narrow entrance. At high water vessels of 250 tons can enter, but it is necessary to secure to the piers or other vessels, so as to keep upright when the tide is out, as a great part of the basin is then dry. Vessels intending to enter the basin anchor during fine weather near the entrance, and large vessels should have the aid of the country boats, as the men belonging to them are necessary.

Depth of water.—The bottom in San Sebastian bay is clean, and there are from $3\frac{1}{2}$ to $5\frac{1}{2}$ fathoms water at low springs, in the middle of the bay ; but it is shallow on the western side. Vessels of 250 tons can enter the basin at high tide, but when the tide is out a great part of the basin is dry.

Mooring buoys.—There are eight buoys in the bay for the use of vessels, to which they make fast ; these buoys have large rings secured to heavy moorings, and vessels ride with two cables ahead and two astern, head to N.N.W. The pilots are charged with securing the vessels, and to caution their commanders how to act.

La Bancha.—The only danger to be avoided entering San Sebastian bay is a rocky shoal named the Bancha, lying mid-way between the points of entrance and 2 cables northward of Santa Clara islet. The shoal covers about the same space as the islet, and the general depths over it are $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms ; but there are patches with $2\frac{1}{4}$ fathoms water over them, near the east end. The sea breaks on it when there is any swell. Between the shoal and mount Chubillo and Urgull, as well as between it and Santa Clara islet, the passages are about 2 cables wide, with 8 and 9 fathoms in mid-channel, and either may be used ; the bottom is rocky.

LIGHTS.—On the northern slope of mount Chubillo, at the west side of entrance to port San Sebastian, is a white lighthouse which exhibits, at an elevation of 428 feet above the sea, a *fixed white* light, varied by a *red flash* every *two minutes*, and visible in clear weather from a distance of 15 miles.

On the summit, at the eastern part of Santa Clara islet, is a round lighthouse of blue limestone, which shows, at 174 feet above the sea, a *fixed white* light, varied by a *flash* every *minute*, and visible in clear weather from a distance of 9 miles.

There is a *fixed red* light at San Martin, close to the baths.

Coal.—About 1,500 tons of coal are kept in store, the price being 16 shillings per ton. A steamer under 250 tons can be coaled in the basin, but vessels of larger size are supplied in the bay by barges. There is about 16 feet of water alongside the wharf.

Pilots.—The port of San Sebastian has an establishment for pilots, and in fine weather vessels are boarded well outside the bay. If the state of the sea prevents boats going out, they lie under shelter of the eastern part of Santa Clara islet, and signalize with a flag to the vessel running in. If the flag is held upright, the vessel is to keep on her course, or to starboard or port, according as the flag is pointed. It is compulsory for all merchant vessels over 50 tons to take a pilot. Those of 50 to 100 tons pay 120 reals; 100 to 200 tons, 150 reals; and those above 200 tons, 180 reals. Anchors, hawsers, &c., are charged for according to a tariff.

Tides and Current.—It is high water, full and change, at the piers of San Sebastian, at about 3h. 0m., but the tide may be accelerated or retarded according to the wind; ordinary springs rise 12 feet, and neaps about 9 feet. With strong winds from S.W. to N.W. the tide rises $1\frac{1}{2}$ to 2 feet above the usual level, and those from N.E. to S.E. depress it below the ordinary level to the same amount. On the coast, in fine weather, the flood sets east and ebb west. In strong winds from N.W. to S.W. the current runs strong to the eastward.

Life-boat.—There is a life-boat and a life-saving apparatus at San Sebastian.

Directions.—Vessels should only enter San Sebastian bay during moderate weather, so as to be able to secure to the mooring buoys without difficulty. From the westward, during bad weather in winter, vessels should be put into Guetaria bay, or other safe port, to the westward. There is a good supply of anchors, cables, and other necessities for all classes of vessels in a building retained for the purpose on the western pier of the basin. The heavy swell, which runs in during a gale outside, produces so much motion in the small navigable part of the bay that it displaces not only the sandy bottom but also lifts the anchors, when vessels are exposed to imminent danger, and no assistance can be given from the shore.

The bay may be taken by sailing vessels with all winds, except those from the south-east quarter. With the wind from S.S.W. to West, and blowing hard, there is some difficulty, in consequence of the eddy winds from mount Chubillo, in entering by the channel between the mount and La Bancha. With north-west winds vessels may enter between La Bancha and mount Chubillo, or by the channel between La Bancha and mount Urgull, as convenient. Should the wind be from the north-east quarter, mount Urgull should be neared, and the channel between it and La Bancha used. This passage should always be used if there is much sea, keeping mid-channel.

When strong winds from north-west prevail, the breakers on La Bancha, which show well, will be the best mark; and should the wind be from West to N.W., brace sharp up, as the current and swell set always towards mount Urgull. With a heavy sea it breaks outside La Bancha, and also across between the mounts Urgull and Chubillo, when a vessel should not enter the bay. In winter, and particularly in the months of January and February, when the land is humid and cold, the south-west winds prevail on the coast even when a north-west gale is blowing in the offing. It often happens that a vessel running with a strong north-west wind and a heavy sea, confident of entering San Sebastian bay, as she approaches, finds the wind drawing ahead, and even off-shore, or falling calm. This is one of the greatest dangers which the navigator has to contend with in making for this bay, for in a heavy sea, the vessels drift unmanagable towards the land.

Coming from the westward the large tower on mount Chubillo will be seen; it is conspicuous, an excellent mark, and cannot be mistaken. The castle of Mota, on mount Urgull, and the lighthouse on the north slope of mount Chubillo are equally good marks. Mounts Hernio and Itzarriz may serve as landmarks by which San Sebastian may be identified from a long distance; also that of Ordaburo, which rises S. by E. $\frac{1}{4}$ E., distant 6 miles from the entrance of the bay, remarkable for two peaks on its summit inclining eastward, and lower down, one leaning in the same direction.

Mount Aya, or Batallera, is also a good point of recognition; it rises S.E. by E. from mount Urgull distant 9 miles, extends N.E. and S.W., and may be known by its three peaked summit, the south-western being the less pointed, and the three inclining in that direction; it reaches about 2,780 feet above the sea. In approaching the land the bay will be distinctly made out, and the islet of Santa Clara, with the houses of San Martin at the head of the bay, will be seen, and finally the town of San Sebastian.

In approaching the eastern passage to San Sebastian bay, do not bring Santa Clara light to bear southward of S.S.W. The church of San Bartholomew (at the head of the bay, on rising ground near the shore) in line with mount Ordaburo, bearing S.S.E. $\frac{1}{4}$ E., leads between La Bancha and mount Urgull; but this bearing leads rather close to Arrocazabala point (the south-west point of mount Urgull); and when the piers of San Sebastian are seen, the vessel may take up a berth in the bay according to her draught.

The *red* light at San Martin in line with Arrocazabala point leads just west of the foul ground lying off the north-west point (Martinacosulua) of mount Urgull.

Mount Hernio, at the back of the high coast land, is seen from the offing, with its three peaks, not very marked, but sufficiently conspicuous to distinguish it from the rest. It rises about S. by W. of the mouth of the Orrio, 7 miles inland, and reaches 3,537 feet above the sea. Farther westward is also seen above the high coast land another peaked mountain, called Itzerriz, 6 miles inland, and about S.S.W. of the estuary of Sumaya. These mountains are good distant marks for the estuaries of Sumaya and Orrio, and the bay of Guetaria.

The coast from mount Chubillo, at the west side of entrance of San Sebastian, is high and precipitous, and trends westward $5\frac{1}{2}$ miles to the river Orrio. The high land immediately over this part of the coast is named mount Igueldo, and the village of the same name stands on its summit, on its eastern part. The most remarkable rise in the mount is the peak of El Agudo, a little south of Tierra Blanca point. The cliffs which distinguish this part of the coast are of a slate rock, which, when wet, reflect the sun's rays and appear in large white patches; but in cloudy weather they lose that whiteness which has obtained for them the name of Tierra Blanca, and show a grayish colour which contrasts with the green appearance of the background.

A series of these white cliffs mark the eastern limit of Orrio bay, and form a point which projects somewhat to the north, but only discerned when the sun shines on the cliffs. They are backed by mount Mendizorroz, or Agudo, 1,514 feet above the sea, by which this part of the coast may be known. Galera point, to the eastward, is more prominent, and a reef projects northward from it for a considerable distance, to which a wide berth should be given. Between the east extreme of mount Igueldo and Galera point is the small bay of Galera, with a narrow sandy beach in the middle of it. The bay is clear of danger.

A rock, named Arribaton, lies near Tierra Blanca point; it is about the size of a large boat, and covered at high water. Small vessels may pass between it and the shore. Further westward, about one mile eastward of the mouth of the Orrio, is the islet or rock Aranarri, low, and about 35 yards in length; in fine weather and a smooth sea, boats pass between it and the shore.

The **RIO ORRIO** rises in the Pyrenees, passes Tolosa, and runs over a course of about 33 miles; it is somewhat larger than the Deva, and its freshes are so strong that vessels in the river are obliged to be additionally secured. The town of Orrio, with its shipbuilding establishments, &c., stands on the eastern bank, more than half a mile within the bar. The river empties itself into Orrio bay between Tierra Blanca point and Malla-arria point, $3\frac{1}{2}$ miles westward. The bay recedes to the south, and the coast is high and rocky.

The entrance has high land on either side, is very narrow, and open to the N.N.W. Within the bar the river soon trends to the eastward, widens, and the water deepens.

The island of Guetaria, or San Anton, and the beach of Saraus are good marks for vessels bound to Orrio from the westward. The old and present lighthouses of San Sebastian, the town of the same name, mount Agudo rising from that of Igueldo, &c., are good marks from the eastward; and the summit of mount Hernio, which rises $3\frac{1}{2}$ miles inland, about S.W. of the mouth of the river, is a good distant mark from the northward.

The bar is of shifting sand, which extends nearly the whole way across between the points of entrance, the channel being on the western side; a vessel should therefore keep close to the west side, and then steer for, and keep in, the middle of the channel as far as the town.

Depth of water.—The mouth of the Orrio is nearly in the middle of Orrio bay, and the bar, which has 2 feet over it at low-water springs, can be crossed by vessels of moderate size, but only at high water with a smooth sea.

Pilots.—In consequence of the bar of the Orrio being of shifting sand, it is requisite to have the aid of a pilot, and it is compulsory for merchant vessels to take one. Very fine weather is necessary for a vessel of moderate size to cross the bar, and when the state of the sea does not admit of entering the river, vessels wait an opportunity in Guetaria bay.

Tides.—It is high water, full and change, at the mouth of the river Orrio at 3h.; and the rise is about 11 feet.

Malla-arria point, in lat. $43^{\circ} 18' N.$, long. $2^{\circ} 10' W.$ (about), projects from the foot of a hill named Talayamendi, at the east side of the bay and plain of Saraus. The point is surrounded by rocks always above water, and the most remarkable of them is named Mairruarri, pointed, not large, but isolated at high water. A heavy sea sets in on the point, and it should be carefully avoided. One mile northward of the rock there is a depth of 19 fathoms.

SARAUS, a town known as the great summer resort of strangers, and for the manufacture of textures, stands on a plain near the beach in the western part of Saraus bay. A small pier for landing extends from the middle of the town, and a rivulet runs into the sea at the east end of the beach. At a short distance south of Ytegin point is Allé point, which projects from the foot of mount Santa Bárbara, on the summit of which is a hermitage. This point forms the western extreme of the bay, of which Malla-arria point is the eastern. The bay is bounded by a clear level beach $1\frac{1}{2}$ miles in length, but entirely exposed to the worst winds of the coast.

Alzacoarria point, the southern extreme of Guetaria bay, is low, surrounded by rocks, and overlooked by high, rugged land. Between the point and town of Guetaria there is a small sandy beach named Malcobre. With the exception of this beach, the shore is rocky and commanded by rugged cliffs over 90 feet high. Ytegin point, half a mile south-east of Alzacoarria point, is a tongue of land which projects from the foot of a cliff, and a cable farther on is the Antimon-arria rock, with a passage inside it carrying from 5 to 8 fathoms, and about three-quarters of a cable wide. This rock shows only at low-water springs, and appears like a buoy.

GUETARIA BAY.—The island of San Anton, or Piedra Alzada, is about three-quarters of a mile in circumference, and rugged, with steep rocky cliffs on its north-west side; there are two peaks, the higher being to the northward, and on which are the remains of a hermitage and a lighthouse. It lies north and south, and is connected with the mainland by a ridge of rocks, upon which a pier, about 145 yards long is erected, in a N.E. and S.W. direction. The island and the main land to which it is united forms Guetaria bay.*

Guetaria bay is considered the outport of San Sebastian and Passages, and navigators will act prudently in putting in here, when bound to either of the above ports in a gale from south-west, which would render their entrance difficult. It is also a good port of call

* See Admiralty plan :—Guetaria bay. No. 725 : scale. $w = 14$ inches.

for vessels bound to Orrio when the bar cannot be crossed, or to Sumaya. At the southern part of San Anton island is the little port of Guetaria, a small space between two piers, with the entrance to the south-west and about 30 feet wide. The town of Guetaria is on the point of the main land, between two cliffs from 90 to 160 feet high, inclined towards the port. It is a walled town, and small supplies may be obtained.

Depth of water.—Port Guetaria is dry at low water, and fishing boats and such craft alone can enter. The bottom is rock, and the craft suffer from the swell when there is any sea.

LIGHT.—On the north peak of San Anton island, and one cable inland, is an octagonal tower, which exhibits, at an elevation of 295 feet above the sea, a *fixed white* light, visible in clear weather from a distance of 10 miles.

Tides.—It is high water, full and change, in Guetaria bay, at 3h.; and the rise is about 12 feet.

Directions.—San Anton island from the westward will be known by its somewhat saddle-like appearance, and the ruins of the hermitage on the northern summit. The tower of the church and some of the roofs of the houses will first be seen, the rest of the town being concealed by the western cliff. At some distance to the northward San Anton island will appear in a conical form, and somewhat blended with the high land from which it projects; but the whitish sand, forming the Playa de Saraus to the east of it, will indicate the position of the bay. A berth of a quarter of a mile should be given to the north point of San Anton; the rocks of Ytegin and those of Antimon-arria should also be avoided; and the swell and eddy wind from the high land should be considered. If the westerly wind be too strong for working in the bay, a vessel may anchor as soon as 8 or 9 fathoms water are obtained, when she will be sheltered.

Anchorage.—The bay, which is open to the eastward, affords anchorage in from 3 to 8 fathoms at low water, sand and mud, good holding ground, and sheltered from the westward as far round as N.N.W., but not farther north, as at N.N.E. vessels are exposed to wind and sea. A heavy north-west sea is inconvenient, but does not risk a vessel's safety; that from the north to N.N.E. is terrific; it seldom occurs, but when it does come from this quarter the seaman must use his own judgment and prepare for the worst. The best anchorage is in 5 fathoms at low water, sand, a long cable S.E. of

the pier. Small vessels may go nearer the shore with a cable fast to the pier. There is a warping buoy at which vessels may lie temporarily, and also a mooring buoy. The position of the east pier is in lat. $43^{\circ} 18' 33''$ N., long. $2^{\circ} 11' 46''$ W.

Coast.—Next westward of San Anton island is the bay of Gasteatape, with a sandy beach and nearly throughout skirted by rocks, some of which uncover at low water. The bay terminates in Bizcarraya point, which is also foul, and between it and Isustarri point, a short distance to the N.W., there is a break in the land through which a small river runs into the sea. Isustarri point is low and salient; a reef extends from it, which in part uncovers at low water; the sea breaks a considerable distance outside it, and a berth of a mile should be given to this point. Then follows Orruaga bay, with a small sandy beach and a rivulet running through it. A factory stands near the shore.

SUMAYA INLET (Zumaya).—San Telmo point is low and rocky, and surrounded by reefs; the hermitage of the same name stands on the heights above it. To the eastward of the point is the estuary of Sumaya, which recedes to the S.W. to the entrance of the river Urola. The river is only of small volume during summer, but in rainy weather strong freshes set down, for which it is necessary for vessels to be prepared.

The town of Sumaya, stands on the western shore of a small peninsula named mount Santa Clara. It is seen from seaward when it bears S.W., and there is a mole close to it for mercantile operations.

Depth of water.—The bar of Sumaya has from 3 to 4 feet over it at low-water springs. The channel is narrow, and can only be taken at high water; it lies along the western shore, with the sands of Santiago on the west.

Vessels of 120 tons frequent the estuary of Sumaya for wrought iron, grain, &c., carrying thither iron ore; and there is sufficient depth at low water for them in the immediate vicinity of the town.

Land marks.—The Piedra Blanca on the west, and the island of San Anton de Guetaria a short distance on the east, are good marks for the Sumaya inlet; on nearing the land, the hermitage of San Telmo will be seen on the height over the west point of entrance, when a vessel should steer for it and make the signal for a pilot. Vessels bound to Guetaria bay during a strong breeze from the N.W. should keep 4 or 5 miles from Deva bay.

LIGHTS.—On mount Atalaya (La Malaya), at the west side of the entrance to Sumaya inlet, about 200 yards within the outer edge of the reef extending from the shore, is an octagonal tower, 39 feet high from base to vane, which exhibits, at an elevation of 139 feet above high water, a *fixed white and green* light; visible in clear weather 10 miles.

The light is of the fifth order, showing *green* towards the land between the bearings of N.W. $\frac{1}{2}$ W. and E. $\frac{1}{2}$ N., and *white* in other directions. The white light is of less power than is usual with lights of the fifth order, as the greater part of it is concentrated to illuminate the bar beacon.

A reflected light is shown from a beacon, in the form of a truncated cone, and buff coloured, surmounted by a globe (23 feet above high water) and cylinder painted white; it is situated 180 yards E. $\frac{1}{2}$ N. from Sumaya lighthouse, and the channel over Urola river bar is 87 yards eastward of the beacon.

Pilots.—No vessel should attempt to enter the inlet without a pilot and the assistance of one or more boats, in consequence of the narrowness of the channel, which scarcely admits of their winding. The expenses are the same as at Deva.

Tides.—It is high water, full and change, at Sumaya, at 3h.; and the greatest rise is 11 feet.

ACHURI or PIEDRA BLANCA POINT.—From San Telmo point, the coast, which is of moderate height, runs westward in a series of rocky cliffs to Achuri point; the most salient part is Piedra point, 2 miles east of the latter. It is all along skirted by rocks, and should not be approached too close. Achuri point, called also Piedras Blancas, lies in the middle of a rocky bay; the point is surrounded by rocks, and the bottom is very irregular, which causes much sea in stormy weather. A berth of 2 miles should be given to it. Piedra Blanca is the name given to some whitish fissures in the land over Achuri point, which in some parts are 415 feet above the sea, and being visible at the distance of about 20 miles form an excellent mark for this part of the coast.

RIVER DEVA.—Santa Catalina point, a long mile westward of Achuri point, extends from a hill on which there is a hermitage of the same name. This point forms the eastern extreme of the Deva inlet, and is surrounded by rocks which uncover at low water. The sea often breaks on the extremity of the rocks, and a berth of a mile should be given to them.

Arrangasiá point forms the western extreme of Deva inlet, it projects to the north-east from the rugged coast, and is surrounded by rocks ; on its eastern side is an indentation with a smooth sandy beach, for which boats usually run when from the swell or the tide being out they cannot reach port Motrico or the Deva inlet.

To the southward of the sandy beach is the bar of the Deva, over which there are 11 to 12 feet at high-water springs. The Deva rises in mount Aramo, but is of little service to navigation, as the bar shifts and nearly dries at low water, leaving only a small channel, and the sea often breaks on it even at high water. The channel is very narrow, and there is much swell in it when there is a sea outside ; it is partly formed by two piers parallel to each other, which nearly reach the bar. Beyond the narrow part of the channel the inlet widens, and on its eastern shore on the north-west slope of mount Andúz is the town of Deva, where most of the inhabitants are employed in the fisheries. Coasting vessels are built here.

The entrance to the Deva will be known by the objects east and west of it, by mount Andúz, 2 miles south-east of the town, and by the conspicuous hermitage of Santa Catalina, eastward of the bar, and on the high land over the point of the same name.

Depth of water.—The bar of the Deva shifts and is nearly dry at low water ; at high water springs there are from 11 to 12 feet over it.

Pilots.—Vessels bound to the Deva should have the aid of a pilot, and one will generally be found off the coast. It is compulsory for merchant vessels to take a pilot.

Tide.—It is high water, full and change, at the Deva, at 3h. ; and the rise is 11 feet.

PORT MOTRICO.—About $1\frac{1}{2}$ miles westward of Arrangasiá point, and a little southward of Atalaya point, is a small cove with rocky shores receding to the south-west. Here between two small piers is the little port of Motrico, where coasting and fishing vessels find refuge ; but the bottom is rocky, and it dries at low water springs. The mouth is narrow and open to the south-east, and when there is much sea small craft are unable to enter.

Outside the entrance, there is a small space with a depth of 4 or $4\frac{1}{2}$ fathoms water, muddy sand, where vessels can lie in moderate weather ; but they risk being wrecked on the cliffs of the cove if bad weather should suddenly come on, and prevent them entering the port. It should only be resorted to by small vessels in summer, for during winter there is nearly always a heavy north-west sea on the coast.

The town of Motrico stands on rather a sudden slope of the land commanding the port. It is seen from a great distance, owing to the whiteness of the houses; but it is necessary to have Cardál point bearing westward of south in order to see it well. Besides the town of Motrico, Atayala point, and mount Arnó, known as Alturas de Arnó, are good marks for it. This mountain is about 2,080 feet above the level of the sea, and bears S.W. 2 miles from Motrico; it extends towards the inlet of Ondárroa, and terminates to the north-west with another mountain not so remarkable, called mount Arnosate.

Depth of water.—Port Motrico dries at low water springs. In moderate weather there is anchorage outside the entrance in 4 or 4½ fathoms water, but it is dangerous if bad weather should come on.

Tides.—It is high water, full and change, at Motrico, at 3h.; and the rise is 10 feet.

SANTURRARÁN POINT.—Atalaya or San Nicolás point is barren, and rocky, and on its highest part is a watch tower. Cardál point is the next westward, with a reef extending from it to the north-east, on which in fresh breezes there is a heavy sea. In a north-west gale, a berth of 3 or 4 miles should be given to Cardál point, when a vessel bound to Guetaria should keep cape Ogoño well open of Santa Catalina de Lequeitio. About 1½ miles westward of Cardál point is Santurrarán point, being the east extreme of Ondárrua bay. This point is rocky, and a reef extends some distance from it; it is commanded by high rugged land, which terminates mount San Nicolain, and also the coast of the province of Guipúscoa. On its west side is a sandy beach, much exposed to north-west winds.

ONDÁRRUA.—At 2½ miles N.W. ¾ W. of Atalaya point is Santa Clara or Peña Mayor point, from which an extensive reef extends to the south-east. It will be known by the hermitage of Santa Clara, which stands on the slope of the land forming the point, and by the watch tower. To the southward of the point the shore recedes to the south-west, and forms Ondárrua bay, about 3 cables wide and surrounded by a sandy beach, but the reefs at either point narrow the entrance.

In this bay, the inlet of the same name trends a short distance southward and then westward to the river Artibas. The bar shifts, but is considered the safest between Machichaco and San Sebastian and is taken when no others can be approached, as it is protected, from the north-west sea by the point and reef of Santa Clara, which enables vessels nearly always to cross it at high water.

A long half mile inside the bar is the pier or landing place, where coasters load and discharge, but they lie dry at low water, and the pier is covered at high water. The town of Ondárrua stands on the western shore of the inlet, faces the south, and most of the inhabitants are employed in the fisheries. Small vessels are built here. A bridge connects the two shores.

Vessels from the westward will find Alto de Lequeitio, together with the point and hermitage of Santa Clara, good marks for Ondárrua, bearing in mind that the hermitage is the only building of the kind seen between it and Lequeitio. In entering the inlet keep along the western shore, where the channel generally lies in a S.W. and N.E. direction. Strangers should not, however, enter without a pilot. If from the eastward, a vessel's position will be known by San Anton island.

Depth of water.—There are from 12 to 13 feet water on the bar of Ondárrua inlet at high-water springs, and one to 2 feet at low water ; but the channel is narrow, and within the bar the whole inlet dries at low-water springs. It is frequented by coasters drawing 7 to 9 feet, and those of the latter draught should enter at high water and in fine weather.

Tides.—It is high water, full and change, at Ondárrua, at 3h. ; springs rise 11 feet, and neaps about 6 feet.

The province of Vizcaya or Biscay commences on the east at Santurrarán point, the east extreme of Ondárrua bay, and terminates on the west at the river Sabiote or Onton. It contains about 40 miles of bold coast, without a port or shelter for large vessels, with the exception of Bilbao. The small inlets and ports which it contains are fit only for fishing craft, &c., which enter them at high water and in fine weather. In the bay on the east side of cape Machichaco is the only place where temporary anchorage may be obtained for large vessels with west and south-west winds ; but here they will be exposed to great danger should the wind suddenly shift to the opposite quarter.

The stormy north-west winds blow with great force on the coast of Biscay, and the heavy sea prevents any mercantile operations in its small ports. The coast is, however, clear of any outlying dangers, and it may be approached to a prudent distance. In the interior the land is generally mountainous and broken. From a distance are seen the lofty and rugged crests of the Pyrenees, the remarkable

peaks of Gorbea and Amboto rising above the sea 5,115 and 4,526 feet respectively. The spurs of the chain, which descend in declivities to the coast, presenting a series of mountain peaks, many of which as seen from the north-west appear in the form of perfect cones. On the coast the land is rocky and barren, with cliffs and ravines. In places the sand appears washed up by the force of the north-west sea, and these are only approachable in fine weather.

Winds.—During summer, the winds from north-east and east prevail on this coast, alternately with those from the north-west and west, and generally fall in the evening, when they are succeeded by the land wind. In the autumn, southerly winds blow hard for two or three days, and at times for eight or nine days; but as soon as they haul to the S.S.W. the sky begins to cover with scud, S.W. and West winds follow, and after some days veer to N.W. with heavy squalls. This wind, which causes a heavy sea on the coast, continues for about a fortnight, being interrupted by two or three days of moderate weather; it may bring heavy rain, with intervals of fine weather, enabling mariners to make the land.

The North and N.N.E. winds are dead on shore, and completely obscure the coast by clouds and continual rain and hail; but they are not of long duration, and generally blow between the middle of December and the end of February or beginning of March. Some winters pass with only two or three hard northers, but in others they predominate very much. North-east winds are not frequent in winter, but sometimes they come with heavy clouds, when they last two or three days and are called *nordeste pardo*, or dry north-easters. As they go down they veer to the east, and are then preludes to southerly winds.

When the winds changes from N.E. to East and S.E. a vessel should close the coast, as a southerly wind will soon follow. But after two or three days of southerly wind, if it veers to S.W., it will not be long before it shifts to N.W. In the spring the winds are moderate, but nearly always from the S.W. or N.W. quarters, accompanied by rain; and in some years they are as late as July.

The north-west sea having a range of the whole distance from the coast of North America causes the most destruction. There is no shore it reaches that does not feel its effects, and it is only in the interior of the inlets at low water that a vessel is not exposed. It is felt from the middle of September or beginning of October, and continues with slight interruption for two-thirds of the year. It is nearly always the prelude of the wind which causes it, and at times

precedes it 24 hours. In the winter, a heavy sea gets up during a calm, rolling in on the coast, breaking in from 20 to 28 fathoms water, and closing the ports and estuaries.

In the month of August, heavy squalls and sudden changes of wind, called *galernas*, are experienced on the coast of Biscay. They gather over the land during the heat of the sun, and rise in the south-west, when the horizon becomes obscure, and by the time the wind reaches West the weather becomes thick. The wind soon veers to the north-west, and bursts violently; so that a vessel should be prepared to receive it, as it does considerable damage. It lasts generally 3 or 4 hours in full force, accompanied with rain, after which it subsides, and the weather becomes clear, and the wind moderate from the north-west, and at nightfall it is calm. At times, particularly in summer, the *galerna* shifts suddenly from S. to N.W. without any warning, and then blows with much force. It is also common to see these two winds striving for the mastery, being separated by a belt of calm, and both of them curling up the sea on their borders. A vessel in this calm belt should be under easy sail for the result.

A southerly wind is foretold by the clearness of the atmosphere, which admits of the peaks of the most distant mountains being clearly seen, and the remotest objects appearing as distinct as if they were only a short distance off. When the wind is easterly, or in a calm, and the high land appears clear, and the summits of the mountains well defined and greyish, the southerly wind is near.

Lightning is frequent at the beginning or termination of bad weather, and also during the gathering of the *galerna*. The distinctness with which the report of guns is heard may be taken as an indication of the wind coming from the direction whence they were heard.

The Barometer rises with winds from the West round by North to N.E., and falls with those from the opposite quarter.

The Currents in the winter set East and N.E., and with greater strength off shore than near the land. On this part of the coast the navigator should be on his guard. It is not easy to determine the velocity of these currents, but in a westerly or north-west gale it may be estimated at 3 miles an hour. In summer the current is scarcely perceptible, and there are occasions when it runs West and N.W.

Directions.—Vessels not bound to Bilbao, or eastward to any of the ports in Spain, would do well to keep clear of the coast of Biscay;

but those bound to any of the above ports should approach it as near as prudent. As the prevailing winds are from the S.W. and N.W. quarters, it will be fair along the coast; and by keeping it aboard, the lights, towns, and remarkable objects are seen by which a vessel's position may be ascertained. The north-west gales in winter lose much of their force near the coast, and the current is not so strong as at a distance from the land. Many wrecks have occurred on the banks of Arcachon from vessels not having been navigated near and in sight of the Spanish coast.

Vessels at a distance from the coast are exposed to the worst state of the weather, and the full force of the currents which set towards the coast of France. The dark and cloudy weather, and the distance off, do not admit of sighting any point by day nor the lights at night; and when, according to his reckoning, the mariner believes himself clear of all danger, he finds himself in a dangerous bight, and on a dead lee shore on the coast of France.

The navigator, in winter time, bound to Bilbao, San Sebastian, &c., should run along the coast from Santoña until the port of destination is sighted.

SAUSATEN BAY.—About 4 miles N.W. $\frac{3}{4}$ N. of Santa Clara point, is San Nicolás islet—the coast between, forming a bay named Sausaten, continuing high, broken, and rocky, but clear and bold, as at 2 cables from it there are 18 to 23 fathoms, mud and sand, except between the point and that of Mocoa, a short distance westward, where the bottom is rocky. In the bay are to be seen the houses of Endaidi and Mendeja, and two guardhouses. The north-west sea does not prevail much in this bay, and, in the opinion of the local pilots, it affords good anchorage for large vessels, with the winds from S.E. round by south to W.N.W.

Anchorage.—The holding ground is good, the anchors sink in deep, and the best berth is between the two guardhouses, at about a mile from the shore, in 23 to 27 fathoms water. The only places approachable for small vessels are the coves of Endaidi, Chantarreca, and Barurdo, and the loading places of Portuchiqui and Portuandi; but these places can only be used in fine weather. The squadron under Sir Home Popham, in the summer of 1812, used to anchor off the cove of Endaidi.

San Nicolás islet is a quarter of a mile in length N.E. and S.W., 139 feet high, with the ruins of a battery on its summit. It is rocky on its north-west and north sides, and lies east of Lequeitio, forming two entrances to that bay; the one on the north-west is the principal, the other, about a cable wide, is nearly dry at low water.

LEQUEITIO.—Between San Nicolás islet and Amandarri point is the entrance to Lequeitio bay ; it is $1\frac{1}{2}$ cables wide, and from the entrance the bay recedes about 2 cables S.S.W. to a clean sandy shore, extending from the town to the mouth of the river Lequeitio. The sands are shifting. It may be taken with facility with the wind from S.W. round by north to S.E. With a south-west wind, close with Santa Catalina point, and keep the coast aboard. The port of Lequeitio is a name given to an irregular mole open to the south-east. It is frequented by coasters, but when there is much sea outside the swell is considerable, and they suffer accordingly. In moderate weather vessels may lie in the bay, but if a sea gets up they must run into the port. Small vessels winter in the river, which runs into the south-east angle of the bay. Amandarri point is in lat. $43^{\circ} 23' 0''$ N., long. $2^{\circ} 33' 2''$ W.

The town of Lequeitio is scattered round the bay, and near the beach, south of the entrance, is the palace of Ulibarren.*

The depth of water in Lequeitio bay is from 4 to 18 feet, and 26 to 36 feet at the entrance ; but there are rocky heads in all parts of it. The port of Lequeitio is nearly all dry at low water, the rocky bottom being covered by a thin layer of sand.

LIGHT.—On the extremity of the cliffs terminating Santa Catalina de Lequeitio point, N.N.W. $\frac{1}{2}$ W. distant nearly $1\frac{1}{4}$ miles from the entrance to Lequeitio bay, is a conical blue lighthouse, which exhibits, at an elevation of 148 feet above the sea, a *fixed red* light, visible in clear weather from a distance of 10 miles.

Tides.—It is high water, full and change, at Lequeitio, at 3h.; springs rise $10\frac{1}{4}$ feet, and neaps 8 feet. The flood is scarcely perceptible, but the ebb is felt in the channel formed by San Nicolás islet, and the swell at times is inconvenient.

Directions.—Mount Otoyó, or Alto de Lequeitio, and the hermitage of Santa Catalina are good marks for a vessel bound to Lequeitio from the north-west or north ; and San Nicolás islet, the town of Lequeitio, and palace of Ulibarren, seen at some distance, and also the conical hill of Calvario, 343 feet above the sea, a short distance southward of the town, are good marks from the north-east or eastward. To enter the bay it is sufficient to steer for the palace, which is conspicuous, giving Amandari point a berth of about 30 yards. In the extreme case of a vessel having to run ashore on this part of the coast, the beach of Lequeitio may be chosen, being

* See Admiralty plan of port Lequeitio, on sheet No. 75, Port Santana.

well adapted for saving the lives of the crew. The vessel should be beached as far westward of the castle as possible, and the soft nature of the sand will secure the safety of the hull, especially if she is grounded at or near high water.

SANTA CATALINA de LEQUEITIO POINT.—From Amandarri point, at the west side of entrance to Lequeitio, a small reef extends, which partly dries at low water. The coast which follows is clifty, bends a little to the south-west, and trends northward to Santa Catalina point. This point projects from the base of the Alto de Lequeitio to the north-east, terminating on all sides in cliffs about 140 feet high, and having a hermitage on it, is very conspicuous; it is clear of danger, and in fine weather may be passed within a moderate distance.

MONTE OTOYO or ALTO de LEQUEITIO.—From Santa Catalina point the land suddenly rises, and about a mile westward reaches 1,782 feet above the sea. It is called Monte Otoyó, but more generally Alto de Lequeitio, and presents some remarkable features seaward, terminating in peaks so clear and distinct as to be easily recognized from the neighbouring land, and is consequently a good mark for this part of this coast.

OGUELLA BAY.—From Santa Catalina de Lequeitio point the coast westward forms a tolerably deep bay, with a rocky shore terminating in Apiquel or Hea point, which bears N.W. by W. $\frac{1}{2}$ W. distant 2 long miles from Santa Catalina de Lequeitio point. There is but one place accessible to boats in summer, which embark fuel and the product of a neighbouring factory. The whole bay is strewn with rocks and some sandy patches; the bottom is irregular, and a heavy sea sets in. Apiquel or Hea point, named also cape Montenegro, is salient and rocky, with a reef extending one cable from it. It separates Oguella and Hea bays, and as with much sea the breakers extend some distance off, it should be avoided.

HEA BAY is formed between Apiquel or Hea point and Nachitúa point, 3 miles N.W. by W. of it. The shore of this bay is nearly everywhere rocky, and in the middle of it is a ravine which extends southward. It has a small sandy beach where the river Hea runs into the sea. The town of Hea is divided by an estuary of the river, into which a small stream falls.

There are numerous rocks in the vicinity of the entrance to the Hea; the most conspicuous is half a mile eastward and a little off shore.

One mile farther east, and about a cable N.W. of Apiquel point, is Cacharri islet, hilly and rocky, having within it a channel about 55 yards across, suitable for boats. The whole coast, as far westward as cape Machichaco, is high, and broken by fissures and ravines, which terminate at the sea in cliffs, some of which are of a considerable height. The coast is generally rocky, although the rocks do not extend far from the shore.

Navigability.—The river Hea can only be entered by small fishing vessels, which find shelter in the little pier harbour within the bar. The entrance is not only narrow, but dangerous, even with a gentle swell, and the bar dries at low water.

OGOÑO ANCHORAGE (lat. $43^{\circ} 25'$, long. $2^{\circ} 41' W.$).—Nachitúa point is steep and surrounded by rocks, and on the heights above it are the houses of the same name. About $1\frac{1}{2}$ miles farther to the north-west is cape Ogoño, and on its east side there is good summer anchorage, with south-west and west winds, in 12 to 15 fathoms water, gravel bottom, about a cable S.E. of Monte de Ogoño, with Apiquel point on with Santa Catalina de Lequeitio point, and the church of Elanchove open of the cape, which is the usual berth.

As it is necessary to be so near the shore in order to obtain shelter, it would be difficult to get away quickly in the event of a vessel being surprised with an onshore wind; the anchorage should not therefore be used by large sailing vessels. In anchoring with strong westerly winds, care must be taken against the strong eddies which come down from monte de Ogoño.

On the east side of the cape some table land extends towards the sea, terminating in tolerably high cliffs, with a bend to the south-west. Here the port of Elanchove is formed by two solid moles, but only capable of sheltering a few small vessels, and it dries at low water. At high water, when there is much sea from north-west, there is a heavy swell in it. The town of Elanchove is scattered along the heights over the port, some of the houses being 460 feet above the sea. The inhabitants are chiefly seamen and fishermen.

Isaro islet.—About 2 miles N.W. by W. $\frac{1}{2}$ W. of cape Ogoño is Isaro islet, two-thirds of a mile in length, N.W. and S.E., the eastern part being 150 feet high. It is rugged, and surrounded by reefs, which extend off a considerable distance, and it should not be approached nearer than a mile. The islet is rocky on all sides, with some vegetation on its summit, and the remains of a convent. The round islet of Arriederra lies a short distance to the N.E., leaving between them a boat channel about half a cable wide.

Between the reefs of Isaro islet and Uguerrey point on the west, the passage is three-quarters of a mile in breadth, and between it and Santa Catalina de Mondaca is another passage, 6 cables in breadth. The depth in both channels varies from $5\frac{1}{2}$ to 13 fathoms, sand, and some rocky places. When there is any sea it runs high in both channels, and often breaks.

Las Lobos.—Two rocks nearly united and uncovered at low water lie between Isaro islet and Anzora point, and are named Los Lobos. They may be passed on either side; but the north channel, which is the better, is a quarter of a mile wide, and carries 25 feet at low water. In using this channel, when the rocks are seen, pass about 30 yards from them. The southern channel, between the rocks and Anzora point, is not so good, and but little used, there being sunken dangers; it is only 50 yards across, and 17 feet deep. These channels should only be used with a smooth sea.

CAPE OGOÑO.—The land of this cape is of a reddish colour, nearly perpendicular on all sides, and rises suddenly to an elevation named monte de Ogoño, nearly 1,000 feet above the sea, having a watch tower on its summit. It is an excellent mark, and there is no other like it on the coast. The cape is bold, and may be approached to 6 or 7 fathoms water. The rugged islet of Arguesto lies about half a cable S.W. of it.

Between cape Ogoño and Anzora or Lara point, about one mile westward, is the bay and beach of Anzora, visible at some distance. A reef extends from Lara point, which partly uncovers at low water. Off the point the bottom is sand with patches of rocks. The houses of Anzora are seen on the slope of the land over the point.

The river Mondaca runs into the sea, southward of Isaro islet, between Santa Catalina de Mondaca point on the west, and the sandy point of Laida on the east. The former point is rugged and rocky, and on it is a hermitage and the remains of a fort.

The town of Mondaca stands on the west shore, about $1\frac{1}{2}$ cables within the bar; it is visible from seaward, and its church is conspicuous. Here is a small pier harbour which affords accommodation to a few coasters and fishing craft. With northerly winds a vessel may easily enter the river; but very generally, and especially in winter, the wind blows off the land; no stranger should enter without the aid of a pilot.

Depth of water.—The navigable channel into the river Mondaca is about 12 yards wide, and 14 to 17 feet deep at low water; but on passing the bar the depth decreases to 4 or 5 feet. The river is

choked with sand-banks, which dry at low water; but at high tide there is a navigable channel along by the western shore for vessels of about 7 feet draught up to Arteagu, and for boats as far as Quernica, two towns in the interior.

Tides.—It is high water, full and change, at Mondaca bar, at 3h.; and the rise is about 11 feet. The water which enters the river on the flood, and that from the river and its tributaries, cause a stream on the ebb at the rate of not less than 3 miles an hour at springs. The sea at times breaks a great distance from the bar.

Uguerrey point, lat. 43° 25' 52" N., long. 2° 46' 34" W. Trompon Mayor is the name given to the highest part of the land commanding Uguerrey point, on which are the ruins of a battery. The Trompon Menor is another small height farther west. The two points of Uguerrey and Atalaya terminate from a plain extending eastward and northward from the base of mount Sollabe; they are similar in appearance and surrounded by reefs.

Atalaya point has the ruins of a battery on it, and a rock, which barely uncovers at low water, lies a short distance from it.

From Atalaya point the cliffs continue southward as far as the mole of Santa Clara of Bermeo, here being the cove and little port of the same name. Outside the mole there are some large rocks, dry at low water, and which partly protect it from the sea.

At a little distance to the eastward of these rocks is another group called Las Laisuas, two heads of which uncover at low water. They are dangerous, and should be carefully avoided.

At a long mile eastward of Bermeo is the entrance to the Mondaca, the coast between being high, rugged, and rocky.*

CAPE MACHICHACO, bearing N.W. $\frac{1}{2}$ N., nearly $3\frac{1}{2}$ miles from Isaro islet, extends from high land, and terminates northward in a salient point; the western extreme of which is of cliffs, while the eastern descends in a gentle slope to the sea. The cape is a continuation of a spur from mount Sollabe, which lies north and south, and from which rises a remarkable peak named Burgon; when seen from the westward or eastward it will be known by its projecting northward, and by a slight saddle-like appearance before its termination.

When on with the high land, from which it proceeds, it is difficult to recognize from any distance, but if not far off, the white lighthouse and buildings connected with it, standing on some table land about one cable from the point, is a sufficient mark. Some authorities

* See Admiralty plan of port Bermeo, on sheet No. 75, Port Santana.

say, "within the point the land gradually rises at an inclination of about 20°, and forms at last a high broad wooded hill. At about half-way up the slope is a sudden break in the face of the hill, which is conspicuous when bearing from W.S.W. round by South to E.S.E."

DANGERS.—Two rocks above water lie a short distance from the cape, and a reef extends from it on which there is often a heavy sea. A vessel should not approach it nearer than a mile.

LIGHT.—The round white tower on cape Machichaco shows a *fixed white light*, varied every *four minutes* by a *flash*. The light is elevated 268 feet above high water, and visible in clear weather from a distance of 20 miles.

MACHICHACO BAY.—Between Uguerrey point and Potoroarri point, half a mile south-east of cape Machichaco, is Machichaco bay, about half a mile deep, with good holding ground, and affords shelter from the S.W. quarter, and partly from the N.W.; but the winds from the N.W. quarter send in much sea, when vessels should leave. It is surrounded by rocks to a short distance from the shore, which is generally cliffy. Potoroarri point is rocky, with an islet near it, scarcely separated from the shore. The only part of the bay which can be approached with a moderate sea is the little beach of Gibela or Arichachú, westward of Uguerrey point, which is commanded by some high cliffs.

Depth of water.—The depths are from 11 to 14 fathoms, and the bottom all over the bay of a sandy nature, but near the shore it is rocky.

The Anchorage is dangerous during winter, as it would be difficult to obtain an offing with a fresh North or N.N.E. wind. A sailing vessel should always be ready to leave and to stand to the eastward, as the coast trends to the S.E., and if her draught permitted she might enter San Sebastian or Pasages, as a N.E. wind is right on shore. The best berth for leaving is in 11 fathoms water, sand, and mud, between Potoroarri point and the ruins of fort Valdés, with Arriederra islet (north-east of Isaro), in line with the hermitage of Santa Catalina de Lequeitio, and the Trompon Mayor on with the trees of the Atalaya de Bermeo, or the centre of Isaro, in line with the peak of Burgon bearing S.E. $\frac{1}{4}$ S. In this position a vessel will be only half a mile from the shore, but in good holding ground.

Bermeo, about $1\frac{1}{2}$ miles westward of Isaro islet, is a small cove nearly one cable wide, 2 cables deep, and open to the north-east

The town stands on the slope of a ridge, facing south. It is not seen coming from the north-westward, but is partly seen coming from the north-east and east; and the chief occupation of its inhabitants, is agriculture, fishing, and salting and drying fish for exportation. It has a small harbour formed by two piers for fishing and coasting vessels, of which a great number belong to the place, but it is nearly dry at low water, the bottom being rocky, covered with mud and gravel.*

Tides.—It is high water full and change, at Bermeo, at 3h.; and springs rise $10\frac{1}{2}$ feet.

Cape Villano.—From cape Machichaco the coast trends in a W. $\frac{1}{2}$ N. direction for about $6\frac{1}{2}$ miles to cape Villano, which is high, broad, precipitous, and foul. Two-thirds of a mile W. $\frac{1}{4}$ N. from cape Machichaco is Aquech islet, round, steep, and clean all round, except towards the land, from which it is distant about one cable; and $1\frac{1}{4}$ miles westward of the cape is another islet, high, rugged, and connected to the land by a bridge, and having on it a chapel dedicated to San Juan de la Peña, which is reached by an ascent of 372 steps. The building and islet can be seen at some distance; on its north side are two rocks above water, and to the south-east of it is a small rocky islet near the shore. The land behind Aquech is high and rugged. In this space, between the two capes, are two indentations of beach, in each of which there is a fishing village, seen from seaward, the first named Baguio, the other Armenta; there is also midway between the two capes a hill, named mount Jata, or Alto de Plencia, which rises about two miles inland, and being the most elevated ground in this locality serves to point out the positions of the capes. As this coast is exposed to northerly winds, vessels should give it a berth of 2 or 3 miles in passing.

Half a mile W.N.W. from cape Villano is a small low islet close to the land, and on its south-west side is Villano point. A reef extends northward from the islet, and in bad weather the sea breaks nearly a mile outside it, when it should be given a berth of 2 miles.

The large promontory projecting to the north-west, named cape Villano, has a look-out house on its summit, about 900 feet above the sea. The land slopes to the west, and terminates in Villano or Ormenza point, which is low and foul, a reef extending seaward. Between this point and Gorliz point are two sunken rocks, known

* See Admiralty plan of port Bermeo, on sheet No. 75, Port Santana.

by the breakers, about half a cable from the shore, and the same distance apart.

RIO de PLENCIA.—The estuary of this river extends in a S.S.W. direction to the bridge of the town, under which boats pass to the mills above. The entrance is between a large high rock named San Valentin on the west, and the sandy point of Gorliz on the east. In the middle is another rock about half the size of a boat which uncovers at half tide. The passage is between the two rocks, but nearer to San Valentin. The course of the river is about 20 miles; it is visited only in summer by some coasting craft and boats, as the mouth is open to the north-west. The town stands at the foot of a hill, on the east side of the estuary, about half a mile up the river. It is not seen from seaward, but the houses of Gorliz, on Gorliz sands, are easily made out. It is high water here at the same time as Bermeo. *See* page 173.

Depth of water.—At high-water springs there are 9 or 10 feet water on the bar, but at low water the estuary is dry, except a small pool with about 4 feet water in it.

The coast from Villano point trends to the southward for a mile to the estuary of the river Plencia, then about W.S.W. 5 miles to Galea point, the eastern point of entrance of Bilbao bay, and is bordered with rocks. The shore is moderately high and even, but precipitous, and, being of a whitish colour, appears at a distance like a track of sand hill. It is exposed to the full force of the north-west sea, and a wide berth should be given to it.

In the extreme case of a vessel near this dangerous coast, from any accident being obliged to run ashore, the sand of Gorliz is a good place to save the crew. The extreme northern part should be selected, where the point forms an elbow and affords shelter from the north-west sea. A small pier at the foot of a hill, and at the extremity of the sand, may serve as a guide, and it will be sufficient to beach half a cable southward of it.

MOUNT LUCERO or LUZUERO, on the west side of entrance to Bilbao bay, extends N.W. and S.E., with a smooth slope to the sea. It is 994 feet high, and, when seen from seaward, resembles the peak of Montaña, westward of it. When in one with mount Serantes Chico, the two appear conical like one mountain. When Lucero bears about S.W. by S., Serantes Chico appears a little open to the left of it. The coast at its foot is cliffy and broken until it joins the sands of Somorrostro, on the south-west. Its N.W. extreme is Lucero point, which is surrounded by rocks.

The peak of Montaña rises 1,122 feet high from the eastern shore of Somorrostro estuary, and is remarkable for its perfectly conical form when seen from the north-west.

Mount Serantes extends N.W. and S.E., like Lucero, and reaches, at rather more than half a mile from the shore of Bilbao bay, an elevation of 1,414 feet above the sea; it presents a conical shape, and is a good mark.

BILBAO BAY* is an inlet running about 3 miles into the land in a south-east direction, between points Galea and Lucero or Luzuero, which bear W. by N. and E. by S. from each other, and are three miles apart. From its entrance, where the depths are 14 and 15 fathoms, sand, the bay gradually narrows and shoals to its head, where the river Nervion discharges. The eastern shore of the bay trends to the southward from Galea point, and continues steep, abrupt, and of a light colour for nearly $1\frac{1}{2}$ miles to Ignacio point, which is red and has a battery on it.

About half a mile within Galea point, on a height, stands the castle of Galea.

A cluster of rocks, some of which are under water, extends N.W. by N. half a mile from San Ignacio point, at the extremity of which, and 3 cables off shore, is the Piedra del Piloto rock, so named from its having, at low water, the appearance of a buoy. About half a mile southward of San Ignacio point is the village of Algorta, with a small pier harbour; the houses are scattered along the height and seen at a great distance. A little farther on is Begaña point, with a battery on it. From thence a low sandy shore runs south-west, about three-quarters of a mile, to the entrance of the Nervion.

Lucero point, on the western side of the bay, is high, barren, and bordered by rocks, which also skirt the shore along the west side of the bay. Nearly half a mile eastward of Lucero point is Ceballos point; thence the shore takes a S.E. by S. direction to the head of the bay. About a mile from Ceballos point is the village of Ciérvana or Siérvana, situated in a deep valley on the shore of a small creek, used only by fishing boats. Los Nogales is the name given to the valley between mounts Lucero and Serantes, on account of its being covered with trees of that name. To the north-east of the valley, in 14 or 15 fathoms water, is the anchorage called Nogales. $2\frac{1}{2}$ miles south-east of Ciérvana is the village of Santurce; and on the coast between are three batteries at about equal distances apart, named Jibeles, Cuartas,

* See Admiralty plan:—Portugalete and Bilbao, with the channel of the river Nervion, No. 74; scale, $\frac{1}{2}$ inch = 5 miles.

and Campillo. Santurce has a small circular pier harbour, which dries at two-thirds ebb, and has a rocky bottom. Here reside the pilots for the bar and river; thence to the river entrance the distance is half a mile.

A breakwater is in course of construction on the western side of Bilbao bay; in December 1889 the foundations extended about 550 yards, N.E. by E. $\frac{3}{4}$ E., from a position on the coast, 275 yards south-eastward of Cuartas point:—

The extremity of the works is marked by buoys, which are moved seaward as the breakwater advances.

A breakwater is also under construction at Begonia point, on the eastern side of the bay.

Depth of water.—At the entrance of Bilbao bay there are 14 and 15 fathoms of water, and similar depths are found in Nogales anchorage.

Winds.—In the bay during the fine season there is a good breeze nearly every day, and the land wind at night; but in the winter, the West and N.E. winds are strong and cause a heavy sea.

LIGHT.—A *fixed white* light is shown from Galea castle, half a mile to the southward of Galea point, the east point of entrance of Bilbao bay. It is elevated 401 feet above high water, and visible in clear weather from a distance of 10 miles.

Semaphore.—A semaphore and telegraph station is situated 273 yards north-west of Galea castle lighthouse. The semaphore is elevated 328 feet above the sea. Vessels should communicate by the International Code of Signals.

A rescue station is maintained at Santurce.

RIVER NERVION.*—The entrance of the river Nervion is formed by the prolongation of the old south-west sea wall towards the bar, and by quays about three-quarters of a cable apart, which are continued along each bank of the river to Bilbao, a distance of about $8\frac{1}{2}$ miles. There are 13 feet over the bar at low water and 26 feet at high water spring tides, and steamers of 700 to 800 tons and 16 to 17 feet draught can go up to the quays at Bilbao. Although the extensive river works, which are now nearly completed, have greatly improved the river channel, there is a decrease in the width of the navigable fairway and an enormous accumulation of sand on what

* "We consider it only our duty to advise shipowners to consider the most serious detention at this port, not only for turns, but for want of water. It appears now there is only about 17 feet at neap tides; therefore it takes very little sea to prevent 15 feet. Vessels lately have been waiting turn about 14 days, and then if not spring tides they may have to wait another 8 or 10 days—perhaps more if any sea on, as the bar is very dangerous and narrow."—*See "Shipping Gazette," 24th January 1890.*

is known as the north-east bank. Vessels should use great caution when entering or leaving the river to avoid the rubble stones, forming the foundation of the new quay, on the one side, and the north-east bank on the other, for should a vessel ground on the bank when there is a heavy sea on the bar, she is nearly certain to be lost. The comparatively few casualties which occur can only be accounted for by the precautions taken in navigating the channel. The entire breadth of the channel, between the quays, varies from three-quarters to about one-third of a cable, with an average depth of 8 to 10 feet at low water.

Merchant vessels are not permitted to enter nor leave the river without the aid of a pilot; but, in the winter, a heavy sea sometimes sets into the bay which prevents the pilot boats from coming out.

On the west side of the entrance, about a quarter of a mile within the piers is the town of Portugalete.

Depth of water.—There are 13 feet over the bar of the Nervion at low water spring tides, and the average depth of water in the channel between the quays is 8 to 10 feet at low water.

Lights indicating the channel.—Electric lights 220 yards apart, are exhibited along the New and Benedicta moles, and quays at Desierto, on the left or south-western shore of the Nervion; similar lights are also maintained along the mole on the right side of the river, opposite Desierto. The light at the head of the New mole is of greater power than the other lights.

As vessels can enter or leave the port with night tides during fine weather, these lights are exhibited from two hours before high water to two hours after. The signals made by the chief pilot from the tower on the south-west sea wall are—a *fired red* light to mark the position of the tower, and a *fired white* light shown on one or other side of the *red* light, to indicate whether vessels should alter course to the north-east or the south-west side of the channel.

Buoys.—There are forty iron buoys in the river, of these fourteen are red mooring buoys, with moorings for large steamers.*

BILBAO, the capital of the province of Vizcaya or Biscay, stands on a fertile plain on the right bank of the river Nervion, about $8\frac{1}{2}$ miles from its mouth. The town is surrounded by hills on all sides, except towards the sea, and when viewed from any of these heights is exceedingly picturesque. The principal buildings are the Cathedral, Town Hall, Consulado or Chamber of Commerce, Museum, Theatre, large Hospital and Misericordia; there are also iron smelting

* It is intended to place ten additional buoys in the river.

works for the rich ore in the neighbouring hills, and about 2,770,125 tons were exported in 1889, to Great Britain alone. It is connected with old Bilboa, on the opposite bank, by three bridges, one of which is an iron suspension bridge.

Shipbuilding is carried on to a large extent, there being several building yards on the river Nervion, and the trade is important, the aggregate value of the imports in 1886 was £2,173,226, and the exports £3,250,000; the chief imports being coal, coke, codfish, timber, and petroleum, and the chief exports iron ore.

4,161 vessels of all nationalities, representing an aggregate tonnage of 3,084,066 tons, entered the port in 1889.

There is steam communication to nearly all the ports of Europe, United States of America, and coasting to all Spanish ports. There is railway and telegraphic communication with all parts of Spain and the Continent, and a direct cable to England.

Ships' stores and supplies may be obtained without difficulty, and there is a dry dock and several workshops for the repair of vessels. The general Spanish Customs and quarantine regulations are in force. Seamen are admitted to the Bilbao town hospital at a fixed charge of 2s. 6d. per diem.

Population of Bilbao in 1890 was 53,000.*

Harbour works.—Important port and river works are in progress, which are now nearly completed. The mole extending from the old south-west sea wall towards the bar is composed of iron and stone, the outer portion being of stone and widened at the end, where it is intended to establish a signal tower. (*See also foot-note page 176.*)

Shipbuilding yard.—A large shipbuilding yard (Martinez, Rivas and Palmer) has been established at Desierto. The works include shipyard, engine works, gun factory, graving and wet docks, and all the requisite departments for producing war ships. Three first-class cruisers are in various stages of construction. 1890.

Docks.—There are two dry docks at Olabeaga, about 1½ miles below Bilbao, which may be used as one dock if necessary. No. 1 dock is 328 feet in length over all, breadth of entrance 44 feet, with 13 feet over the sill at high water spring tides. No. 2 dock is 308 feet in length over all, breadth of entrance 44 feet, with 14 feet over the sill at high water spring tides.

* From information received from Horace Young, Esq., H.B.M. Consul, Bilbao, 1890.

A dry dock is in course of construction at Desierto, which will be 470 feet long, 105 feet broad, and 35 feet deep.

Coal.—4,000 to 5,000 tons of coal are always kept in store, and a good supply may be obtained at 16 to 17 shillings per ton, delivered in the bunkers. Coaling is usually performed by barges.

Life-boat.—There is a life-boat, and rocket apparatus at Portugalete.

Submarine Telegraph Cable.—At Bilbao, the terminus of the cable is on *playa de las Arenas* (*playa de Guecho*), close to the cable house; it is thence laid in a N.N.W. direction for $1\frac{3}{4}$ miles, and after a slight westerly bend for $2\frac{1}{2}$ miles, passes out of Bilbao bay; it then turns N.E. by E. $\frac{3}{4}$ E. for about $3\frac{1}{2}$ miles, and finally N. by E. $\frac{3}{4}$ E. to England.

Mariners are cautioned not to anchor in the vicinity.

Olabeaga, about $1\frac{1}{2}$ miles below Bilbao, extends along both banks of the river; large vessels lie secured along the south-west sea wall, with their heads up the river. All kinds of stores and provisions may be obtained here.

Freshes.—The province of Biscay is proverbially rainy, and in the winter months one incessant fall of rain lasts throughout, notwithstanding which the freshes of the river are capricious in their visitations. In May, 1850, the river at Bilbao suddenly rose 18 feet above the average high-water mark, and the loss of property in consequence was immense. The destructive freshes occur mostly on a continuous fall of heavy rain after dry weather.

Tides.—It is high water, full and change, on the bar of the Nervion, at 3h., springs rise 13 feet; at Olabeaga, at 3h. 15m., springs rise 12 feet; and at Bilbao, at 3h. 20m., springs rise 9 feet. With fresh N.W. winds the tide rises nearly 2 feet higher at the bar, and the time of high water is half an hour later; whilst the contrary effect takes place with strong winds from N.E. to South, which should be taken into consideration. The stream of the ebb runs 3 knots at springs, and $1\frac{1}{2}$ at neaps.

Caution.—It is necessary to be particular in calculating exactly the time of high water on the bar of the Nervion river, if intending to enter, so as to be delayed in the bay as short a time as possible.

Pilots.—Vessels bound to Bilbao, in fine weather, will generally find a registered pilot a short distance from the land to the westward. They seldom await vessels eastward of Bilbao, as the land is generally made to the westward. The chief pilot, whose duty is to guide

vessels across the bar, is in attendance at the tower at Portugalete, from which he directs the vessel's course by flag signals. The assistance of a pilot when entering or leaving the port is compulsory for merchant vessels. The pilot boats carry a red flag.

Signals.—The signals to vessels crossing the bar are made by the chief pilot by means of flags, as stated above ; a red flag being used for vessels entering and a white flag for those leaving the port. The flag is inclined to the N.E. or S.W., and held vertically if going well ; and it should be remembered that the flag is to direct the vessel's head and not the helm. When the flag is waved the vessel is to stop.*

Directions.—The bay of Bilbao will be easily recognized, when approaching it from the eastward, by cape Machichaco, as well as that of Villano (remarkable by the islet near it), and by the deep opening of the bay itself. From the westward it will be known by mount Santoña, the town of Castro Urdiales, and the peaks of Lucero, Montaña, and Serantes. Approaching from the north-west the mountain of Amboto, 4,526 feet above the sea, with its head inclining westward, is an excellent mark, and with it bearing about S.E. by E. leads to the bay ; on nearing which, the white and reddish sands of Algorta and Guecho will be successively seen, the light-tower and semaphore on the highest part of the cliffs of Galea, the town of Algorta, that of Portugalete, the church of which is visible at a great distance, and the buildings near the end of the north-east mole ; the south-west mole and the little white circular pilot tower are also conspicuous objects.

With a fresh westerly breeze vessels should wait off Castro Urdiales for the favourable moment to enter the bay. In fine weather there is no difficulty in entering the bay at any time, and anchoring off Nogales (*see* page 175), or nearer the bar, in 8 or 9 fathoms water, to await either daylight or high water.

As the worst gales are those from North round by west to S.W., a vessel should, particularly in winter, close the coast about Santander or Santoña, so as to be able to enter these ports in case of bad weather or to keep to windward of Bilbao in the event of having to heave-to ; besides the chance of meeting with a pilot, as they seldom or ever fail being on that part of the coast.

It would not be prudent in a large vessel to enter the bay during bad weather without a pilot ; but if embayed at neap tides, and on-shore winds, and unable to get out without a press of sail, the anchorage of Nogales would be the best, where the holding ground

* See footnote on page 182.

is good. The best berth is half a mile from the shore, in 14 or 15 fathoms water, sand, with Galea point on with cape Villano; a second anchor should be ready to let go.

Should a vessel of light draught get into the bay during a gale, and the tide favourable for crossing the bar, attention should be given to the signals made from the shore. Sail should be kept on the vessel so as to keep before the sea, and the head sheets aft to pay her off in case of broaching-to; also care should be taken that the men are not washed off the deck, as two or three heavy seas may probably break over the vessel. In a heavy gale the sea begins to break in a direction between Galea point and Ciérvana cove, and therefore a vessel will be in the breakers long before her arrival at the bar; but inshore the sea is smoother.

The bar is taken in all winds, excepting those from S.E. to S.S.W., which are off-shore. Those from the south predominate much in October and November, and are very strong at the entrance of the bay. The wind comes down in squalls and eddies from the high land on the west coast, and in working for the bar the vessel should keep between the east coast and the middle of the bay, so as to avoid the eddies. For vessels of large draught the high tide from 2h. to 5h. p.m. is the best, and they should be at the bar an hour and half before high water.

The bar may be taken even an hour after high water, if the vessel can make headway against the current.

A vessel should leave the river before the flood is done, and the best tides are those between 5h. and 7h. a.m., so as to have the land-wind, which scarcely ever fails, if it does not blow hard outside. Departure should never be attempted with the ebb tide, or with a sea on the bar. The assistance of a steam tug may always be obtained.

In moderate weather, during the summer months, the land and sea breezes prevail on this coast with tolerable regularity. During the winter north-west gales are frequent, and invariably accompanied with rain; if also with lightning, they may be expected to blow hard. Southerly winds prevail about the vernal and autumnal equinoxes. They blow at times with great force, are generally dry and warm, though when veering to the south-west they are accompanied with rain. The barometer generally gives warning of their approach by a sudden fall of 0.25 or 0.30, and perhaps more; and, though these are off-shore winds the bar frequently becomes impassable when they blow strong.

During the summer season, sailing vessels waiting tide to enter the river should stand off and on, keeping outside the bay and well to the westward, in order to avoid being driven on cape Villano by the north-west swell, should the wind fail.

Regulations for entering the river.—On sighting the semaphore on Galea point, vessels must show their number, to which the semaphore will answer with the same number on the mast, and at the yard arm another flag, indicating the number in turn given to the vessel for crossing the bar, which latter number the vessel shall keep hoisted at the masthead, and take her corresponding place among others to enter the port ; and there must always be at least one cable between a vessel and the one immediately preceding her.*

Directions for approaching the bar.—The general mark for approaching the bar, is Portugalete church in line with the Pilot's tower, bearing S. by E., which will lead a vessel up to the south-west mole. Further directions are not given, as no vessel is permitted to enter or leave the river without the aid of a pilot.

CAUTION.—Between Villano islet and Rabanal point, $13\frac{1}{2}$ miles to the westward, the coast forms a bight nearly 4 miles deep, and in the middle of it is Bilbao bay, forming a cod, which recedes 3 miles to the south-east. This deep bight is dangerous with in-shore winds, for with much sea a vessel would find difficulty in getting out of it. It would therefore be prudent to avoid this bight, unless bound for Bilbao, and at a time when the bar is practicable. A heavy sea sets in on the coast with strong winds from N.E. to W., and, with the exception of Castro Urdiales, there is no refuge for vessels whatever. Southerly winds acquire a terrific force in this bight, and from vessels being unable to carry sail they are blown off the coast.

RIVER SOMORROSTRO.—From Lucero point, the west point of entrance of Bilbao bay, the coast trends to the south-west, and forms a bay ; and one mile from the point is the entrance to the Somorrostro, the bar of which is dry at low water. The village of Muzquiz and various houses are scattered along the western shore of the river. Between the mouth of the river and the western slope of mount Lucero is the sand of Somorrostro, which may be seen 15 miles off, and the hermitage of Nuestra Señora del Socorro, on the western side of entrance, is also conspicuous.

* Masters of vessels should make themselves acquainted with the regulations for entering or leaving the port, anchoring and mooring, taking in and discharging cargoes, quays, tugs, fire-arms, &c. The regulations are strictly enforced, and any infringement of them will render the offender liable to be fined.

Depth of water.—At high-water springs there are 8 feet over the bar, so that it can be crossed only in fine weather by vessels of light draught, which visit the inlet for iron ore, rich mines of which are worked in the neighbourhood.

Directions.—In standing for the river Somorrostro, keep under the west shore of the bay. Muzquiz point, on the west side of the entrance to Somorrostro, is low and rocky, and the coast westward, for 2 miles to the town and small bay of Onton, is moderately high and bold, with elevated land in the interior. The bay being full of rocks, cannot be used, even by small vessels. The river Onton separates the provinces of Vizcaya, or Biscay, and Santander.

The coast from Onton river trends about N.N.W. $\frac{1}{4}$ W. 3 miles to the Peña de Santa Ana, near the town of Castro Urdiales; in this latter space is the village of Mogoño with its bay, too shallow even at high water to admit any but small vessels, which load with iron ore.

The province of Santander is bounded on the east by the river Onton, or Sabiote, and on the west by the river Deva. It contains about 65 miles of coast, somewhat indented, but deficient of harbours capable of receiving large vessels. Santander, the most capacious, often presents great difficulties in entering with gales from the N.W. and S.W. quarters, which so frequently happen during winter and spring. The land of this part of the coast is high, but of less variety than that of the province of Astúrias, which follows to the westward. The cliffs are not so remarkable or uniform, nor does the shore present the level land which characterises the coast of Astúrias; and the mountains of the interior, although high, are more gentle in their acclivities, and their offshoots towards the sea are more gradual, and without those rugged summits which distinguish the high land of Astúrias.

The higher parts of the Pyrenees are concealed from the view of the mariner when near the coast; but at a sufficient distance from it, the remarkable peaks known generally by the name of Urrieles, extending some distance east and west, and embracing parts of the provinces of Oviedo, Santander, and Leon, are excellent marks for correcting a vessel's position, when the state of the atmosphere admits of their being seen. The highest of these elevations, and conspicuous from its pyramidal form, is that called Torre de Cerrredo, which rises in the province of Leon, and reaches about 8,903 feet above the level of the sea.

More remarkable, however, from its outline, and the facility with which it is distinguished, is that called Naranjo de Bulnes, 8,504 feet above the sea. Its isolated position, its figure like the portion of a column standing vertically above all, and its barren and red appearance, prevent its being taken for any other peak; besides which it is nearer the sea. The summits of the mountains are covered with snow during a great part of the year, and to vessels making the coast between cape Peñas and cape Mayor, particularly between Rivadesella and Barquera, they are very distinct.

Winds.—The prevailing winds on the coast of the province of Santander during winter are southerly, which veer to south-west and north-west. The southerly wind during its first days preserves a clear atmosphere, and is considered by navigators as the precursor of a north-west wind. It begins to set in during October, and ends in February. Should it become cloudy with rain, the wind veers to S.W., and soon after to W., and nearly always with dark cloudy weather, which terminates in a north-west gale and heavy showers. When the wind is north-westerly it is clear between the showers, enabling the mariner to recognise the land.

Heavy gales generally begin from the southward by blowing hard, and the harder it blows the more clear is the weather. When the sky becomes entirely overcast, the wind may be expected to haul to the north-west with heavy showers. If the wind changes from N.W. to N. or N.N.E., it becomes very severe, admits of no canvas being shown, closes all the ports, and makes the coast a dead lee shore. If a northerly gale, after lasting two or three days, changes to N.W., the gale will freshen up again; but should it veer to N.E., the weather moderates and some fine days follow. But should the wind veer to the E. and S.E., it will continue on to S., and all the bad weather will come over again.

In autumn these changes of the wind are generally attended with fine weather, particularly after the gales of the equinox. The spring is nearly always a continuation of winter, during which the vendavales (westerly winds) predominate, if not with as much strength of wind, certainly with as much rain. In summer, here considered as commencing in July, winds from the north-east quarter prevail, which on the coast become more northerly during the heat of the sun, and from the land at night.

The barometer rises with westerly winds round by north to N.E., and falls with all others.

Currents.—During winter the currents generally set to the eastward, caused by the continual winds from the S.W. and N.W. quarters. In a north-west gale their rate may be considered more than 3 miles an hour. A strong current to the eastward in fine weather is generally a prelude to a north-west gale. A considerable rise of the water above the usual level in the different ports is also a prelude to similar weather. In summer, currents may be found setting W. and W.N.W., but not strong ; so that it may be considered as a general rule that there is a constant easterly current at some distance from the coast, especially off cape Peñas.

CASTRO URDIALES.—About half a mile S. by E. from Rabanal point is the Atalaya de Castro Urdiales, which is a perpendicular mass of rock about 68 feet high, and on which are the remains of a look-out tower. A little to the N.W. of it there are several detached rocks, and an islet close to the shore. Close to south-east of the Atalaya, and upon another rocky eminence of greater height, stands the castle of Santa Ana, an ancient fortification with four large circular towers, one at each angle. The castle is white towards the sea, and visible at a great distance. On the south-east side of the castle is the Peña de Santa Ana, another rock 63 feet high, scarped on all sides except the west, where it has some slope ; on its summit is a chapel dedicated to Santa Ana. Between this rock and the castle there are two others, one larger than the other, the whole connected by bridges to communicate with the chapel. Walls have been raised for the purpose of connecting these rocks, and sufficiently high above water to impede the entrance of the tide, and to protect the bay of Castro Urdiales.*

LIGHT.—On the south-eastern tower of Santa Ana castle is a circular light-tower, which exhibits, at an elevation of 148 feet above high water, a *fixed white* light, varied by a *red flash* every *three minutes*, and should be visible in clear weather from a distance of 7 miles.

Cotolino point.—At about half a mile south-eastward of the Peña de Santa Ana is Cotolino point, low and rocky, forming the south-east extreme of Castro Urdiales bay. One-third of a mile farther to the south-east is Miono point, which is high, steep, and clear ; both points extend from the Cueto de Miono, a height with an oval base, and appearing of a conical form when seen from the westward. There is a small sandy beach on the western side of Cotolino point,

* See Admiralty plan :—Port Castro Urdiales and adjacent bays, on sheet of plans, No. 710.

where the river Brazomar runs into the sea, and from which the beach takes its name.

To the eastward of Miono point is the beach and the river of the same name. Here is the small port of Miono, or Dcido, available for vessels of light draught at high water in fine weather, which convey iron ore to Orinon and places on the coast of Biscay. The village of Miono stands close to the shore inside the port. At the eastern extreme of Miono sand is a high rocky point named Salta-Caballo. The land in the interior is high and mountainous.

Castro Urdiales bay is limited, and only convenient for vessels of light draught. It affords shelter from N. round by W. to S.E.; but when there is a heavy sea from N.W., vessels lie very uneasy. It is open to the eastward, and should only be considered as a temporary anchorage. The bottom is nearly everywhere rock, covered with a thin layer of sand. The depth in the bay is from 3 to $4\frac{1}{2}$ fathoms at low water. Vessels of 9 to 11 feet draught may remain in the bay during bad weather, or for the tide to cross the bar for Bilbao. The southerly wind in winter is violent, and it is necessary to have good anchors to prevent driving on the Santa Ana rock.

The port of Castro Urdiales is formed by two moles, with the mouth, 45 feet wide, open to the southward; but a heavy swell runs into it with a N.W. or northerly sea, and causes much damage to small craft. The bottom is rock, with a slight layer of sand and mud, and at low-water springs the whole port is nearly dry, excepting near the mouth, where there are 5 to 8 feet. It has sufficient room for 130 fishing boats and 15 to 20 coasters, which are secured in tiers. The town, which is surrounded by walls, faces the port, and extends north and south, so that seen from the east it presents a pleasing and imposing appearance. Its principal trade is in fish. The river Brazonar falls into the bay south of the port.

The town is seen from a great distance, particularly the church, which stands on elevated ground, a little west of the castle and lighthouse; when the town cannot be seen, the peak of Cerredo is a good mark. The numerous rocks which surround the bay are detached from the main land.

Depth of water.—There are from 3 to $4\frac{1}{2}$ fathoms in Castro Urdiales bay at low water. The port is nearly all dry at low water springs except near the entrance where there are from 5 to 8 feet.

Tides.—It is high water, full and change, at Castro Urdiales, at 3h.; springs rise 12 feet.

Directions.—To enter the bay from the westward with winds from that quarter, Rabanal point should have a berth of at least a mile, then continue on for the castle and cliffs of the Peña de Santa Ana, which may be closed to the distance of one-third of a cable, as they are steep-to. The bay should only be frequented by vessels that can enter the port.

Coast.—The coast between Castro Urdiales and Santoña, 8 miles westward, is high and mountainous in the interior, but the shore is low and generally clear of danger. Rabanal point is foul, and a good berth should be given to it when there is any sea; between it and Castro Urdiales is a bay about 3 cables deep, but open to the north-east.

Castro Verde bank.—At 8 miles N.N.E. $\frac{1}{4}$ E. from Rabanal point there is a small bank, named Castro Verde, with 25 to 37 fathoms water over it, on which there is a considerable sea, which sometimes breaks. Between the point and bank the depths are from 55 to 65 fathoms. In bad weather care should be taken to pass well outside, or well inside, this bank.

The bank lies with Monte Cabarga de Santander in line with the highest part of mount Brusco, and with a hummock on Castro, on which is a chapel, in line with the peak—not very prominent—of monte Cerredo, named the Verde. The Verde peak is westward of the highest peak of Cerredo.

MOUNT CERREDO.—This mountain is rugged and broken to the westward, and extends eastward to the town of Castro Urdiales. Its northern side slopes gradually, and terminates in low land at the coast, which appears in large patches of slate rock. At its base is the river Oriñon. Towards the western side of the mountain, and in the vicinity of Islares, the peak of Cerredo reaches an elevation of 1,813 feet above the level of the sea, and on it there is a landmark. This peak is a good mark for Santoña and Castro Urdiales.

A similar high mountain, visible only at a distance seaward, rises $5\frac{1}{2}$ miles inland, S.W. of the Cerredo and South of the Candina. There is a very conspicuous hummock on its summit, named Castro, crowned by a chapel. The mount is the most elevated in the valley of Guriezo, and is a good mark for Santoña—much used by fishermen.

The shore eastward of Islares point is low, with slight bends, and appears in large whitish patches. It terminates eastward in a large high cliff, named La Castra point, which is 3 miles eastward of Oriñon point, and about a third of a mile S.E. of it is Rabanal point, low and rocky.

Cerdigo rock is a low, dark islet close to the point of the same name, between Islares and Castra points, and connected to the shore by a reef. In a strong breeze the sea washes over the islet.

MOUNT CANDIÑA rises on the coast one mile eastward of the headland of Ahorcado to about 1,390 feet above the sea, and is remarkable from the white patches which are conspicuous in the midst of the dark woody land. The mountain is of calcareous rock, which appears here and there, and terminates in peaks; but these are not so conspicuous as those of mount Santoña westward. Between the mount and the bay of Yesera westward there is an islet close to the shore, leaving a passage for boats. Several other rocks lie close to the shore between Ahorcado and Laredo.

ORIÑON, or SONAVIA, POINT.—From the foot of mount Candiña, a narrow, low arm of land projects to the north-east, named Oriñon, or Sonavia, point. A ridge rises from its middle, and it is connected to the main by a narrow low neck, which is partly covered at high water, and entirely when there is a high sea. Seen from a distance this tongue of land appears like an island some distance from the shore. Its extremity is rocky, and with any sea it should not be approached nearer than half a mile.

To the south-east of the above point is Islares point, and the town of the same name is near it. The point is low, a little salient, with rocks off it; it forms the east extreme of Oriñon bay, the sands of which extend to the foot of mount Candiña and some way up its eastern slope.

ORIÑON INLET.—Near the western extremity of Oriñon bay is the mouth of the Oriñon inlet, which recedes southward to the valley of Guriezo, and receives the river of this name. Small coasting vessels enter the inlet, with iron ore for the foundries in some of the towns of the Gureizo valley. The river winds along on the eastern side of mount Candiña; it has a shifting bar, which at low water is nearly dry. The village of Oriñon stands on a sandy plain on the western shore of the inlet, which reaches up the slope of the mount. On the opposite shore is the village of Islares.

At a distance seaward, the inlet of Oriñon may be recognized by the great ravine which the land forms between mounts Cerredo and Candiña. The white sand of Oriñon may also be seen at a great distance, and the point of the same name appears like an island.

LAREDO.*—One mile westward of the foot of mount Candiña

* See Admiralty plan :—Port Santoña, No. 75; scale, $m = 2.85$ inches.

there is a high, steep, and rugged headland, named Arhocado. On its east side is the little bay of Yesera, where, in fine weather, small vessels load with a chalky substance found in the pits in the neighbourhood. The coast thence is steep and clear for 2 miles westward to Rastrillar point, which slightly projects. The point is surrounded by rocks, and a battery stands on the cliffs. On its west side is the walled town of Laredo, whose inhabitants are chiefly employed in the fisheries. The mole is choked with sand, and the boats have to be beached. From Rastrillar point the shore forms a bay, which trends northward to Passage point. Between these points, a distance of about 2 miles, are the sands of Laredo, or Salué, which extend along the shore of the bay.

Light.—On dark nights a *white* light, which is visible 4 or 5 miles, is exhibited from the mole when the fishermen are out.

Life-boat, &c.—There is a life-boat and life-saving apparatus at Laredo.

MOUNT SANTOÑA is of an irregular form, 5 miles in circuit, and 1,322 feet above the sea. It is nearly isolated, being merely connected to mount Brusco on the west by the sandy plain or isthmus of Berria. It is formed of calcareous rock, broken towards the sea, and covered with fertile soil. It has several peaks, Escalera or Canzo being the highest. The conical peak of Nespral is 1,090 feet high, and on its summit is the atalaya or look-out tower, which is circular. The mount at a distance appears like an island, which in reality it is, as the heavy seas break through the dyke which joins it to the main land, and the waters unite with those of the lagoons which surround Santoña.

Mount Santoña may also be known by its height, peaks, look-out tower, its white and reddish cliffs, and by the white rocky land near its summit, which contrasts well with the dark wood beyond it; mount Brusco, on the west, is also a good mark for it. Care should be taken not to mistake mount Santoña for mount Candiña, which rises on the coast S.E. by S. of it; but the latter has not so many peaks, and no look-out tower. On nearing it from the westward the fort of Mazo, standing on a height 715 feet above the sea, fort Napoleon at a short distance from Atalaya point, and the village of Dueso on the north-west slope of the mount, will be successively seen.

From a long distance the mount of Nuestra Señora de las Nieves will be seen, with the chapel on its summit. It is some 2,516 feet

above the sea, and when in line with mount Santoña bears about S. $\frac{3}{4}$ E. From the eastward mount Santoña appears somewhat open and isolated. When running for Santoña inlet in a N.W. gale, care should be taken not to approach the coast too near on the north side of the mount, so as to avoid the breakers on the Doble bank, which is $1\frac{1}{2}$ miles from the shore.

LIGHTS.—On Pescador point, the north-east extreme of mount Santoña, is a circular white lighthouse, which exhibits, at an elevation of 126 feet above the sea, a *fixed white* light, varied by a *flash* every *three minutes*, and in clear weather should be seen from a distance of 17 miles.

On Caballo point, the east extreme of mount Santoña, and nearly three-quarters of a mile S. $\frac{1}{2}$ E. of the former, is a conical tower, which exhibits, at an elevation of 85 feet above the sea, a *fixed red* light, seen from seaward between the bearings S. by W. through West, and N. by E. $\frac{3}{4}$ E., from a distance of 10 miles.

SANTOÑA INLET.*—The entrance to this inlet is formed between the shore of mount Santoña and the adjoining beach on the north, and the beach of Passage point, and Pitorro bank (which extends from the sands of Laredo) on the south. The inlet is divided into various channels, the principal being that of Colindres on the south, immediately after passing Passage point. This channel trends southward for $2\frac{1}{2}$ miles, when it joins the little stream called Rada. It is navigable for small vessels as far as the town of Colindres, about $2\frac{1}{2}$ miles up, and carries 7 to 12 feet at low water; but at the entrance of the Cicero there is a rocky bank with only 4 feet water over it.

About $2\frac{1}{2}$ miles within the principal channel is Limpas channel which runs south-eastward over 2 miles to the town of that name, when it trends southward to the villages of Marron and Ampuero; here it receives the Marron, a small stream in summer, but swollen by the freshes in winter.

The most important town of the inlet, commercially considered, is Limpas from its communication with Castile. Vessels of 11 to 13 feet draught load here with grain and flour; those above 13 feet draught complete their cargoes lower down, abreast the town of Treto. The town of Santoña is entirely military, with neither commerce nor industry, and stands at the foot of the mount of the same name, on a level sandy plain, surrounded by trees and gardens, with marshes to the northward of it and creeks on the west.

* See Admiralty plan :—Port Santoña. No. 75; scale. *m* = 2·85 inches.

The port affords shelter and safety to vessels that frequent it. The best anchorage is in 6 or 8 fathoms water, off the battery of Isabel II. which is on the beach south of the town, and partly covered with trees. The breadth of the navigable channel is between one and 2 cables, and the depth from the bar westward to the Ano channel is from $3\frac{1}{2}$ to 8 fathoms. The Ano channel is another branch of the inlet, which, leaving the Colindres on the south, continues westward to the towns of Bárcena and Escalante, but has little depth at low water.

Mount Ano, 574 feet high, is of conical form, like the peak of Cabada de Santander, and covered with a thick wood. It is on the north bank of the Ano channel, and isolated by a small channel or dyke which surrounds it. A convent stands at the foot of the mount on its south-east side, and is the only building in the vicinity. Passage point is the north extreme of the extensive sands of Laredo (*see* page 189), and is remarkable for its bareness; it projects in a N.N.E. direction, and on it may be seen the ruins of a castle, one of the marks for entering, but which is rather difficult at first to make out. The castle is in lat. $43^{\circ} 26' 8''$ N., long. $3^{\circ} 30' 20''$ W.

Bar.—The Pitorro bank extends from Passage point in an E.S.E. direction for $1\frac{1}{4}$ miles, when its edge trends to the southward, and at low water there are from 3 to 10 feet water over it. Pitorro bank and that of San Carlos, north of it, form the entrance to the inlet, the two being connected by the bar. The bar, which fronts the entrance of the navigable channel, is about $1\frac{1}{2}$ cables across, with 9 or 10 feet water over it at low-water springs. After crossing the bar the depth increases from 3 to 8 fathoms, to the anchorage.

Buoys.—A buoy with staff and ball is moored on the southern side of the bar, and two red buoys are also moored on the south side of the channel, the inner one being just north of Passage point. There is also a red buoy on the north side of the channel, 3 cables north-west from the outer buoy, just within the bar. The positions of these buoys cannot be depended on, as they frequently drift, and sometimes break away from their moorings.

San Carlos bank.—Nearly 2 cables W.S.W. of Fraile point is the Redonda rock, close to the shore, and half a mile farther on is San Carlos point, which is steep, and on which is the strong castle of San Carlos. Between Redonda rock and San Carlos point, San Carlos bank, with 4 to 10 feet water over it, extends 2 cables to the south-south-east and joins the bar, and in a large vessel care is required when entering.

Directions.—The inlet of Santoña being open to the south-east, cannot be entered during north-west winds, which are the most stormy on this part of the coast, and blow down over Santoña mount in heavy squalls, for which a sailing vessel should be prepared. The most favourable winds for entering the inlet are those from N.E. round by East to W.S.W. With moderate winds from other points, a vessel will have to work in, or back, and fill, with the flood. With north-west winds a vessel may run down as far as Fraile point, when it will be necessary to tow or steam, as the wind draws ahead. With a northerly wind a vessel may reach Redonda rock, but southward of the rock the wind draws out, and renders entering under sail impossible.

There is anchorage in $4\frac{1}{2}$ fathoms about 3 cables S. by W. $\frac{3}{4}$ W. from Fraile point, from which with steam or a tug a vessel may get into the inlet. With a fair wind bring the castle of San Carlos—the most southern fortification on a high cliff at the foot of mount Santoña—in line with mount Ano, until Fraile point comes in line with Caballo point (north of Fraile point) bearing about N. by E. $\frac{3}{4}$ E.; then steer S.W. $\frac{3}{4}$ W., which will take a vessel over the bar in 9 feet at low-water spring tides, until the convent under mount Ano is in line with the ruins of the castle on Passage point—the remains of a wall, which will be seen between the small downs at the termination of the point, and the seaweed which partly covers it—and then steer for the battery of Isabel II., and anchor off it in 6 or 7 fathoms water about $1\frac{1}{2}$ cables from the shore at Santoña.

In a large sailing vessel, with a scant or foul wind, a pilot should be taken, as the edges of the Pitorro and San Carlos banks are subject to change, and the channel only known to those frequenting it. Vessels of more than 50 tons are charged pilotage. A steam vessel may, however, enter by attending to the directions given. Vessels moor N.E. and S.W. Between fort Isabel II. and Cruz point the bottom is stiff clay and good holding. The worst winds are those from South to West, which blow strong, when it is necessary to drop another anchor, as accidents often happen. The southerly winds blowing with great force down the Colindres channel cause much sea; on this account, in winter, vessels should anchor near the Ano channel. Vessels bound to Limpias anchor at Santoña to deliver the papers.

Pilotage from Santoña to Limpias is 90 reals for vessels of 50 to 150 tons, and 120 reals for those of larger tonnage.

Tides.—It is high water, full and change, in Santoña inlet at 3h.; springs rise $12\frac{1}{2}$ feet, neaps $10\frac{1}{2}$ feet. The ebb is always much stronger than the flood, running about 3 miles an hour at springs, which much facilitates leaving the port during north-east or easterly winds. When much rain has fallen, and the river Marron has heavy freshes, the ebb acquires considerable strength, and the current of the Colindres channel disturbs the beach of Santoña. Vessels should then anchor farther westward, so as to be clear of the mouth of the above channel. In winter it is prudent to lie near the channel of Ano.

The ebb tide on leaving the mouth of the inlet sets to the S.S.E., over the Pitorro bank and into Laredo bay. Vessels becalmed are liable to be set on Rastrillar point, if precautionary measures are not used. The flood tide in entering the inlet sets strong on Passage point and into the channel of Colindres.

Fraile anchorage.—Vessels will find shelter off Fraile point, mount Santoña, from a north-west gale when unable from any cause to get into Bilbao. The anchorage is good with winds from the S.W. to N.W., but vessels ride uneasy if there be much swell. Caballo point, the north-east extreme of the mount, may be passed at the distance of 2 cables; anchor about $1\frac{1}{2}$ cables N.E. of Fraile point, in $7\frac{1}{2}$ or 8 fathoms at low water, sand. A good berth will be found, in $7\frac{1}{2}$ fathoms, with Fraile point bearing W. by S. $\frac{1}{2}$ S., and Caballo point N. $\frac{3}{4}$ W., $1\frac{1}{2}$ cables from Merana shoal, which is near the shore.

Vessels should lie here at single anchor, and be ready to slip or get under way either for the inlet or to stand eastward, should the wind suddenly shift to N.E. Fraile point is 140 feet high, rugged, perpendicular, cannot be mistaken, and is seen the moment Caballo point is passed. This latter point is low, rocky, slightly projecting, commanded by high precipices, and is known by the circular light-house and keeper's dwelling.

Doble bank, named by the fishermen Ganzanilla, is dangerous in a heavy sea, and lies about $2\frac{1}{2}$ miles off the beach of Bérria. There are 10 fathoms water over it, 16 and 18 fathoms close around, and between it and mount Santoña 15 to 18 fathoms. From the least depth on the bank the battery of Cueva bears S. by W. $\frac{1}{2}$ W., Pescador point S. $\frac{1}{2}$ E., cape Machichaco S.E. by E. $\frac{3}{4}$ E., and cape Quexo W. by N. $\frac{1}{2}$ N.; mount Ano appears a little open west of mount Brusco, and cape Ajo a little open of cape Quexo. Vessels bound to Santoña inlet in a north-west gale should be careful to avoid this bank, as there is not only a heavy sea in its neighbourhood, but at times it breaks.

Playa de Berria.—Between mount Santoña and Brusco point, one mile westward, is the isthmus of playa de Berria, a low, flat, sandy plain. The beach is clean, but, near Brusco, rocks appear above water; the inhabitants of Santoña communicate with the country by means of a road over the sand.

Mount Brusco is a dark-looking mountain, from being covered with wood, rising at the south end of Noja bay; it terminates at the sea on its east side in the point of the same name. The point is rocky and foul, and near it end the reefs which skirt Noja bay.

NOJA BAY is formed between Brusco point and Garfanta point, nearly 2 miles northward of it. Its shore is low and rugged, with a level beach scattered with rocks, the latter at low water appearing above the sand; the shore throughout is skirted with rocks, which extend half a mile off, and the water is shallow outside of them. When there is any sea, the breakers extend to a considerable distance from the shore; hence the bay should be carefully avoided. The church in the town of Noja, south of Garfanta point, is conspicuous from seaward; it stands in the middle of a plain, and not far from the shore.

Garfanta point, commonly called Mesa de Noja, is level, rocky, arid on the summit, projects to the north-east, and terminates in rocky points and reefs; the latter extend out some distance, and should be avoided.

CAPE QUEXO is $1\frac{3}{4}$ miles from Garfanta point, and on its summit is an old watch tower; it affords shelter from westerly winds, and terminates in broken cliffs. On the east side of the cape the shore is low, and interspersed by a rocky beach; and some isolated rocks lie near the shore; the largest is named Isla, on which there is an hermitage, and a short distance outside is an islet. Between cape Quexo and cape Ajo, 3 miles westward of it, the coast is low, rocky, arid, and of a reddish colour.

Capes Quintres, Ajo, and Quexo, seen from the westward or eastward, present an even projecting surface. The town of Isla is seen south of cape Quexo, not far from the shore, in the midst of trees and cultivation.

CAPE AJO, 3 miles westward of cape Quexo, and 8 miles E. $\frac{1}{2}$ S. of the lighthouse on cape Mayor, is the most salient point of all this coast. It is clear of danger, and may be approached to a prudent distance. It resembles Quexo, but not so high as Quintres, which is situated 2 miles to the south-west. Nearly a mile south-east of cape

Ajo is the mouth of Ajo inlet, a narrow arm of the sea, which admits boats at high water to go as far as the village of Ajo, standing on a plain south of the cape one mile from the sea.

The coast between capes Ajo and Quintres is bold, the land forming cape Quintres being high and level, and the ruins of a look-out house are seen on its summit, and to the south-west the ruins of a tower. When seen from the west and north-east the cape appears perpendicular.

CAPE GALISANO is situated S.W. by W. $\frac{1}{4}$ W., 2 miles from cape Quintres; it is formed of cliffs terminating in steps, and it may also be recognised by a small remarkable peak known to navigators as the Pico de Galisano. To the eastward of the cape is the sand of Galisano, where fishing vessels find shelter from S.W. and westerly winds. The river Galisano falls into the sea between capes Galisano and Langre, after passing near the town of Galisano; it flows from the south, and boats can only cross the bar at high water in fine weather. The coast eastward of the river is of cliffs of little elevation, but in the interior the land is high and mountainous. One mile westward of the cape is the rocky point of Langre, and about the same distance farther on the island of Santa Marina, on the east side of entrance to Santander.

PORT SANTANDER is the best harbour on the north coast of Spain, eastward of cape Ortegal, but it should not be attempted by a stranger, as the tides are strong, and the banks within, formed of the deposits brought down by the streams which discharge into it, frequently shift. Neither should it be attempted in a north-west gale if the vessel can keep the sea; and even after the gale, for a day or so, it should be approached by a sailing vessel with caution, in order not to get so far embayed as to be unable to haul out again, should the bar (as it is termed) be up; for at this time from Mouro islet to Puerto point, and across to the Puntal sands, is one confused sea breaking in 7 and 8 fathoms water.*

The entrance to the port is between Santa Marina island and cape Mayor, which bear from each other N.W. $\frac{1}{4}$ W. and S.E. $\frac{1}{4}$ E. $2\frac{1}{2}$ miles. The south shore of the inlet trends to the south-west, and is fronted by extensive sand flats, which dry at low water, and are intersected by numerous channels; but at high tide the inlet shows a large extent of water.

Cape Mayor, the west point of entrance, is steep, and about 200 feet high, with a lighthouse a little to the westward of it.

* See Admiralty plan :—Port Santander. No. 76; scale, $m = 5.2$ inches.

Cape Menor, half a mile to the S.S.E., is lower than the former cape, and has a battery on its summit; it terminates in a low flat point, with a small reef, on which the sea occasionally breaks, and also at some distance outside it.

At $1\frac{1}{2}$ miles S. by E. from cape Menor is Puerto point, which is low, and on it is a square brick light tower, 38 feet high. On the high ground over the point is the remains of a fort. Between the two points a bay, with a beach named Playa del Sardinero, in which vessels anchor when the wind and tide are adverse for entering the harbour. The best position is in 8 fathoms, sand, 3 cables south of cape Menor, farther south the bottom is rock and stone. There are three batteries on the shore of the bay, and N. by W. $\frac{3}{4}$ W., $1\frac{1}{2}$ cables from Puerto point is Ano castle and semaphore, which stand on a precipice.

From Puerto point the shore trends to the westward, then round to the north and west to Promontorio point, forming a bight $6\frac{1}{2}$ cables wide, which is very shallow and full of rocks. A short distance west of Puerto point is Cerda battery.

Torre islet lies close to the shore of the bight, to which it is connected by rocks at low water; the islet is low and divided into two parts, which are united by a natural bridge. One cable south-west of it is a rocky bank with 8 feet water.

About one cable south-east of Torre islet is a smaller islet, named Horadada; it is pierced through so as to resemble two rocks connected by a bridge; this islet is marked by a beacon. San Martin point, situated three-quarters of a mile westward of Horadada islet, has a battery on it, and half a mile westward the town of Santander commences; thence the shore trends round to the south and east, the whole being fronted by extensive sand-flats, which dry at low water, and leaving a navigable channel throughout the whole extent between them and the shore of from $1\frac{1}{2}$ to 2 cables wide.

About 2 miles westward of the town, the elevation named Peña Castillo, 396 feet high, rises from the shore, and when seen from the westward it appears conical. The Alto de Miranda is a hill about 278 feet high, commanding San Martin point.

Navigability.—Vessels of 24 feet draught can navigate the channel from sea and enter the port at high water neaps and low water springs.

The greatest draught of any vessel which has entered the port was 25 feet. 1890.

The town of Santander,* and capital of the province of Santander, is a place of considerable commercial activity, it is well built, and extends northward and westward on the sides of two small hills crowned with trees, which contribute to its picturesque effect. The cathedral stands on the summit of the hill which runs along the shore of the inlet, at the foot of which commences the line of rail leading to Palencia and Valladolid. A little west of San Martin point is the dry dock, in course of construction, the Carenero and a recess called the Darsena. A handsome line of houses runs along in the rear of the quays facing the south. The captain of the port's residence, the health office, and custom house are situated on the quay. In 1884 the population was about 40,000. In 1889, 520 vessels of all nationalities, and representing the aggregate tonnage of 553,224 tons, entered the port. The chief exports are flour, wine, and iron ore; the imports being coal, flax, timber, and alcohol. The aggregate value of the exports in 1889 was £898,000, and the imports £2,109,466.

There is communication by rail, coasting steamers and telegraph.

There are foundries, marine stores, and a steam factory, where iron ships can be repaired, but no dock accommodation. The extensive harbour works which are in progress will include both dry and wet docks. There is no home for sailors, and the only hospital in the place is the public one. There are no special quarantine or custom-house regulations.

Here will be found all the resources looked for in a commercial port.

Coal.—Coal may be obtained for steaming purposes, and there are generally from 300 tons upward kept in store, the price being £1 per ton, delivered on board if alongside the wharf, and £1 2s. 6d. per ton in the stream by lighters and steamers.

The available depth at low water alongside the wharf is from 20 to 25 feet.

Water.—Ships may water alongside from tanks, and from fountains at the quay.

A life-saving apparatus is maintained at Somo and Cerda, Santander.

Mouro islet, commonly called Mogro, lying at the entrance of the port, bears E. $\frac{1}{4}$ S. from Caballo point, distant about 4 cables from the shore. The islet is rugged, and nearly circular, it is less

* Revised from information furnished by H.B.M. Vice-Consul Santander, 1887 and 1890.

than a cable in diameter, and about 90 feet above the sea, with a white stone light tower on it. A rock above water, named the Corbera, lies half a cable from the east side of the islet, with some rocks on its south-west side which uncover at one-third ebb; a bank with $1\frac{1}{2}$ and 2 fathoms water on it lies three-quarters of a cable from the west side of the islet, off Raposa cove. In a gale from the north or north-west the islet is enveloped in spray.

Pico de la Cabada—or Cudio of the pilots—is a conical hill 830 feet high, and rises about S. by W. $\frac{3}{4}$ W. $5\frac{1}{3}$ miles from Mouro islet. It is easily known by its peculiar form, and the woods upon it, which give it a dark appearance, and when in line with the Alto de Ruballo leads through the western passage.

A mountain named Cabarga, ranging east and west, about 1,970 feet above the sea, and a short distance westward of the above, is another mark for Santander.

Alto de Ruballo is a hill sloping east and west entirely covered with wood, rising about S.S.W. $1\frac{1}{2}$ miles from Mouro islet.

Arenal del Puntal.—The extensive sands of this name, which dry at low water, border the shore west of Santa Marina island and form the southern boundary of the channel to the port of Santander, extend for nearly a mile northward from the Alto de Ruballo.

Banco de las Quebrantas.—This is a dangerous shoal, with from 6 to 15 feet water over it, extending northward 4 cables from the Arenal del Puntal in the direction of Mouro islet. Its extremity lies with the castle of San Martin open south of Horadada islet, and capes Mayor and Menor in line. The channel between it and the islet is half a mile wide, with $3\frac{1}{2}$ to 7 fathoms water.

LIGHTS.—The tower on cape Mayor, $1\frac{3}{4}$ miles from the entrance to Santander, exhibits at an elevation of 298 feet above high water a *revolving white* light, which attains its greatest brilliancy every *minute*, and should be visible in clear weather from a distance of 20 miles; the eclipses are not total within 8 miles.

A blue flag hoisted at the lighthouse indicates to vessels signalling for the assistance of a tug that she cannot put to sea.

Puerto point light.—A square brick tower on Puerto point, at the entrance to Santander, exhibits, at an elevation of 79 feet above the level of the sea, a *fixed green* light, obscured westward of a S. $\frac{1}{2}$ W. bearing, and having $\frac{1}{4}$ a sector of 5 degrees of *white* light covering Horadada islet. The light should be visible in clear weather from a distance of 4 miles.

Mouro islet light.—From the tower on Mouro islet is exhibited, at an elevation of 136 feet above high water, a *fixed white* light, visible seaward, through an arc of 270° between the bearings of E. by S. through South to N. by E., from a distance of 12 miles. Through the remainder of the circle a faint light will be seen at the distance of $4\frac{1}{2}$ cables from the lighthouse.

Capitania light.—A *fixed red* light is shown at the Capitania near the railway station, at an elevation of 30 feet above the sea, and should be visible in clear weather from a distance of 3 miles.

Pilots wait in adverse weather under the lee of Puerto point, and it is compulsory for all merchant vessels above 50 tons to take one ; too much reliance, cannot, however be placed upon their knowledge.*

Tides.—It is high water, full and change, at the bar of Santander, at about 3h. 20m. ; springs rise 12 feet : at the town, it is high water full and change at 3h. 30m. ; springs rise 15 feet, neaps 12 feet. The ebb stream is stronger than the flood, and attains the rate of 4 miles an hour at spring tides, during which there is very little slack water.* In the mouth of the harbour a branch of the ebb stream turns to the S.E., towards the bay south of Santa Marina island, which should be carefully guarded against. In the rainy season the strength of the ebb is considerably increased, making the entrance difficult for a sailing vessel without a strong fair wind. Gales from south-west and north-west cause the tide to rise from one to 2 feet, and those from north-east and south-east depress it.

Buoys.—A large mooring buoy lies, in 5 fathoms, about 4 cables W. $\frac{1}{2}$ S. of Horadada islet ; a conical buoy is moored on the edge of the bank, off Rabiosa point, on south side of channel abreast Horadada islet ; and three-quarters of a mile west of this buoy lies another conical buoy, on south side of the channel abreast St. Martin's castle ; there are also three buoys on north side of Banco del Bergantin.

The positions of these buoys cannot always be depended on.

Directions.—The position of Santander will be recognized when approaching it from the westward by the reddish white sandy tract on the west slope of Liencres hill (page 202), which rises 7 miles westward of the entrance, the island of Cabrera or Suances, and Ballota point ; and if from the eastward, mount Santoña, and capes Ajo and Quintres. Cape Mayor, the west point of entrance, may be known by being rather more elevated than the line of coast, and

* Navigating Lieutenant A. J. Burniston. H.M.S. *Terrible*, November 1868.

terminating abruptly, with a light tower on its summit. The town cannot be seen from seaward.

It is of the utmost importance that a vessel from the westward, with a fresh breeze from that quarter, should close the coast and make out the land, so as to be certain of the vessel's position. With any sea, if near the coast, the San Pedro del Mar (page 201), a rocky bank on which the sea often breaks, should be avoided. During southerly winds the coast is clear, but with those from S.W. or N.W., when blowing hard, it is generally obscured. With the wind from the eastward, between N.N.E. and S.E., a vessel may pass on either side of Mouro islet; but large vessels from the westward, with the wind from N.N.W. to N.E., should enter by the western channel, called the bar, which should be taken at half flood.

Steer in with the peak of Cabada in line with the middle of the Alto de Ruballo, until southward of Mouro islet and past Puerto point; and when Horadada islet is in line with Promontorio point, steer for Peña Castillo; passing half a cable from Horadada islet and a cable from San Martin point. But if at the time of low water, and the vessel's draught is 13 or 14 feet, stand on with the Capitania of the port in line with San Martin point until westward of Torre islet, and the Polvorin (the powder magazine in the bay eastward of Promontorio point) bears N.N.E., when the rock S.W. of Torre islet will be cleared.

Promontorio and San Martin points should be passed at the distance of about half a cable, and the line of coast followed to the anchorage within the Capitania del Puerto; or vessels may anchor southward of Promontorio point, or, if necessary, in any part of the channel westward of Puerto point. Moor with open hawse to the southward during winter, with a long scope on the starboard anchor, as the wind from that quarter blows with great violence. Should the wind be from the westward, and the tide flood, when the Peña Castillo is well open of Horadada islet, a vessel may back and fill up to the anchorage with her head to the northward, bearing in mind that two-thirds of the way across the channel the tide sets to the south west.

With an ebb tide it will be better for a sailing vessel to anchor off Sardinero beach, but a heavy swell rolls into Sardinero bay during a north-west gale, when it would not be prudent for a large vessel to run for Santander, if she can keep the sea. It will be better to remain outside and to windward of the port, bearing in mind that the easterly current sometimes attains the rate of 5 miles an hour. A vessel unable to keep the sea may try the anchorage off Sardinero

beach, attempt the entrance of Santander, or run for the port of Santoña, but as it breaks on the bar, at Santoña, with a heavy north-west sea, it cannot be taken until 4 or 5 hours flood, and then only with a fresh and fair wind.

Vessels generally leave the port with the land wind in the morning, even with a flood tide; but a vessel may leave with a foul wind and ebb tide by backing and filling. To ensure getting well out, it will be prudent to drop down previously to one of the outer anchorages.

Anchorage may be obtained in $4\frac{3}{4}$ fathoms, sandy bottom, with Horadada islet bearing E. $\frac{1}{2}$ N., and Promontorio point N.N.W. $\frac{3}{4}$ W.; also in rather deeper water, with the north point of Santa Marina on with Cerda castle, or in fact anywhere within Puerto point. The anchorage for small vessels is higher up, within the Capitanía del Puerto.

THE COAST from cape Mayor is steep and rocky, and trends westward one mile to a headland of lower elevation, named cape Lata, with an islet named Ansion on its north-west side; thence follows a lower but still rocky shore for three-quarters of a mile to Cornuda point, when it turns more to the south for two-thirds of a mile to a small open bay with a sandy beach named San Pedro del Mar, with a battery on its east point.

On the west side of the bay a narrow inlet runs westward, in which fishing vessels find shelter in north-east and easterly winds; but if there be any sea from the north-west, it cannot be entered, for the sea always breaks on the bar, which is of rock. There is a water mill in the inlet, and at high tide launches go up to it, where they lie in safety.

About $1\frac{1}{2}$ miles westward of San Pedro del Mar is the islet of Nuestra Señora del Mar, with a hermitage on it; the islet is rocky, low, steep, and joined to the land by a bridge. One mile farther on is the point and watch-tower of San Juan del Canal, high and precipitous, and between is a small bay with a sandy beach receding to the south-westward, and useful for boats in westerly winds and a smooth sea.

Cabezo de San Pedro del Mar bank.—A bank named Cabezo de San Pedro del Mar, and of some extent in an east and west direction, lies $1\frac{1}{2}$ miles from the shore off San Pedro del Mar. It has 10 or 12 fathoms water over it at low tide, and 18 fathoms between it and the shore. The sea often breaks on this bank, and even near it, and vessels should either give it a wide berth or

pass inside it. From the depth of 10 fathoms on the bank cape Mayor light-tower bears S.E. easterly, the Hermitage of N. Señora del Mar S.W. by W., and the west point of Cabrera islet West. The roof of the Hermitage of Virgen del Mar is on with the middle of the road to Santander, both objects being a little west of the peak of Viérnoles ; and Cabrera islet appears within Ballota point.

The above part of the coast is low and rugged, but higher towards the interior, forming a long and even range as far as cape Mayor. An inner range running east and west, which is the Alameda Alta de Santander, and the village of Cueto, with numerous houses and buildings, are seen ; and above these ridges the Peña Castillo, 390 feet high, rises from the shore of Santander inlet.

Between San Juan del Canal point and Somocuebas point, $2\frac{1}{2}$ miles south westward, the coast is broken, low, and clifffy, with sandy beaches. It is fronted at a short distance from the shore by a chain of rocks above water, known by the name of Urros de Liencres. There is a channel between the rocks, and also between them and the shore, for small craft in fine weather ; but outside them the bottom is foul, and no vessel of any size should approach them. Somocuebas point, called also Liencres, is rather low, rugged, and projects westward. The low coast following for $2\frac{1}{2}$ miles to Cuerno point forms a bay ; and as far as Aquila point, $1\frac{1}{2}$ miles on, is a clean, flat sandy shore, off which breakers extend a long distance out.

Mogro river.—A small islet lies off Aquila point, and eastward of it the river Mogro or Pas falls into the sea, passing on the western side and at the foot of the hill of the same name. The bar can only be crossed by boats at high water and in fine weather, for at low water it is dry. In the river there is sufficient water for small craft, and in the winter it is swollen by freshes.

The LIENCRES HEIGHTS rise between Somocuebas point and Mogro peak, and extend $1\frac{1}{2}$ miles N.N.E. and S.S.W. ; they are of a dark colour, and on the southern part there are two well-defined peaks resembling a saddle ; the southern peak being the higher, and 695 feet above the sea. The town of Liencres, remarkable by its high church tower, is seen at the northern part at the foot of the heights. Extensive sands of a light red colour, named Val-de-Arena or Liencres, between Somocuebas and Aquila points, extend in from the shore and about 165 feet up the slope of the heights, and can be seen from a distance of 15 miles. It is the only elevated land on the coast between Suances and Santander, and is a good mark for vessels from the westward for the latter port, and cannot be mistaken.

Pico de Mogro is a small isolated conical hill about 535 feet above the sea, and the village of the same name stands on its north side. The peak is conspicuous, and used as a mark for San Martin de la Arena. The mariner is warned not to mistake this peak for that of Cabada, nor the sand of Val-de-Arena for that of Puntal (page 198).

Cuerno point, the east point of entrance to San Martin de la Arena, projects northwards, and terminates in a reef which connects it to Pasiëga islet, nearly a cable distant. On the western side of the point are several rocks, which only show at low water, the outermost of which are called Joaquina and Xarillo; the latter is $1\frac{1}{2}$ cables W. by S. from the point.

SUANCES ISLANDS.—A group of five islands, denominated the Suances, lie off Cuerno point. The northern and largest, named Cabrera or Conejos, is 2 cables long and half a cable wide, and its east end is 175 feet high. It is bounded all round by cliffs, difficult of access. When seen from the westward it appears small and square, from its being end on. It may be approached to a short distance, as it is bold and clear of danger; the rocks on the south side are connected to its shore. The west end of the island is 3 cables distant from Cuerno point.

Between Cabrera island and Cuerno point is Pasiëga island, low and surrounded by reefs. There is a clear narrow channel between these two islands, carrying $5\frac{1}{2}$ fathoms water, but no passage between Pasiëga and the point, except for small craft at high water. The other three islands, Casilda, Segunda, and Solita, lie eastward of Pasiëga, with channels between them for small craft. About three-quarters of a mile S.W. by W. $\frac{3}{4}$ W. of Cuerno point is Barra point, the inner point of entrance to the inlet of San Martin de la Arena; the coast between forms two small bays, separated by Umbrera point. The western bay is the larger, and contains a small beach named Playa del Patrocinio; the shore of the other is steep rock. Cuerno point and the islands off it bound the east side of entrance to San Martin de la Arena, and Dichoso and Torco de Afuera points are on the western side.

SAN MARTIN de la ARENA, or SUANCES.—This inlet although nearly $3\frac{1}{2}$ cables wide at the entrance proper, is narrowed within by sand-banks on either side, which dry at low water, leaving a channel from about a half to a cable wide. The entrance is entirely open to the north, and the points of Dichoso and Torco de Afuera afford only slight shelter from north-west and westerly

winds. The bar is constantly shifting; every gale and every fresh of the river changes it. When the freshes are strong the water forces itself through the sand and leaves a channel 6 or 7 feet deep; but a gale from the northward causes the sand to accumulate, and to dry at low water.*

The bar may be taken in all winds, except those from S.E. to S.W., whenever the state of the tide and sea admits. At the time of a great fresh, which will be known by the colour of the water some distance outside, the entrance should not be attempted, on account of the strength of the stream. The land on either side of the inlet is covered with wood and meadow, and scattered with villages and farm houses. The principal village of the inlet is Suances, which stands on a height on the western side; it is the first village on entering, and here the pilots, the marine authorities, and health officer reside.

Requejada is a small village, with large granaries, which give it an imposing appearance, about 4 miles up the inlet, on the eastern bank, near the high road from Santander to the interior. At low water there are 12 to 13 feet, mud, near the landing place of the village, and foreign vessels having cargoes of grain and material for the railways proceed here to discharge. No other description of merchandise is allowed to be disembarked; vessels arriving in ballast discharge it at Suances. This port, as well as those of Comillas and San Vicente de la Barquera, are in the vice-consulate of Santander.

The rivers Saja and Besaya during the rainy season discharge so much water into the inlet that it overcomes the stream of flood tide, and renders it difficult for a vessel to make way against it.†

Bar.—The average depth on the bar may be about 2 feet at low-water springs, and the channel within carries from 3 to 20 feet; the nature of the bottom is mud or muddy sand nearly throughout, and in places the latter depth is found close to the shore at low water. Vessels entering this inlet should not draw more than 9 or 10 feet, for although vessels of 11 to 12 feet draught can enter under favourable circumstances, much time is lost in waiting for spring tides, which are not always accompanied with moderate winds and a smooth sea, and thus two or three months may be lost. A small lift of the sea always prevails on the bar, and 4 or 5 feet should be allowed for this.

* See Admiralty plan :—Entrance of San Martin de la Arena; scale, $m = 5$ inches, on sheet of plans on the north coast of Spain, No. 88.

† A red conical buoy marks the extremity of the breakwater under construction at Mazan point.

LIGHTS.—On Torco de Afuera point is a white tower, which exhibits, at 118 feet above the sea, a *fixed white* light, visible from a distance of 7 miles.

Tides.—It is high water, full and change, at the bar of San Martin de la Arena, at 3 h.; springs rise 12 feet. The stream runs in the direction of the channel 4 miles an hour between Atalaya and Marzan points, and increases considerably in the freshes. The swell generally rolls in heavily with north-west winds; and with fresh winds from S.W. to N.W. the water rises from one to 2 feet above the usual level of high tide, but winds from the opposite quarter depress it from one to 2 feet. The entrance should be approached, by the larger vessels that enter, on the flood.

Pilots.—Pilots are indispensable for this river. When unable to go out, they wait inside the breakers, and the vessel is then guided by the signals made from a green hillock about 55 feet high, called the Atalaya, on the first point on the western side within the entrance. From the Atalaya the bar and channel are distinctly seen, and a white flag is held in the direction the vessel should steer. When the bar is passable, the flag is kept in a vertical position; when impassable, it is waved to and fro.

Directions.—When bound to San Martin de la Arena, the light-tower on cape Mayor, the heights and sand of Lienes, the peak of Mogro, and Cabrera or Conejos island, are good marks on the east; whilst on the west are Ballota point (high and steep), the Meseta de Cortiguera, and the heights (400 feet high) on which stands the town and church of Suances on the west side of the inlet, and the white lighthouse on Torco de Afuera point, at the entrance to the inlet. If the low coast land cannot be made out, and that in the interior is clear, the peak of Viérnoles, 1,600 feet above the sea, which rises S.S.E. $\frac{1}{4}$ E. from the entrance of the inlet, is a good distant mark. In closing with the inlet the rocks west of Cuerno point should be avoided.

Pilot signals.—If the bar be passable, and a pilot unable to come out, it will be requisite in entering to observe strictly the direction the flag is waved from the Atalaya within the entrance. While the flag is held upright the vessel is to keep on her course; but if pointed to port or starboard, steer in that direction until the flag is again held upright. When within the bar the pilot will board and take charge of the vessel. If too much sea or little water, the flag will be waved from side to side, and the vessel should stand off. If on returning to the entrance the flag is held stationary, the bar may be taken, but the mariner must consider the tide and vessel's draught.

Dichoso point, the west point at entrance to San Martin de la Arena, is low, rocky, and of a light colour, with a rounded hill on it named the Alto del Dichoso. A narrow, low neck separates it from the inner land, which makes it appear at a long distance from the westward like an island.

A bank about 20 yards in extent, with 15 and 16 fathoms water over it, lies N. by W. $\frac{1}{2}$ W., 2 miles from Dichoso point. Between it and the point there are from 25 to 28 fathoms, decreasing to 18 fathoms near the point; and at a short distance outside the bank, 36 to 55 fathoms. It is named the Canto, and in strong winds there is a heavy sea on it, and a wide berth should be given to it. When the Luaña and Torriente banks break, the Canto also breaks, and it probably forms part of the same (page 207).

Bailota point is a remarkable salient, steep black point, lying north-east of Santa Justa, and is sometimes called Negra point. Reefs extend from it, and Percebera rock, about the size of a ship's launch, dries at low water a short distance from its extremity. The rock is steep-to, and there is a passage inside it for small craft. The coast between this point and Dichoso eastward forms the bay of Garrera. Outside the bay the bottom is clean, and water deep.

Calderon point is low, rocky, and projecting. The point is sub-divided into two; one point projects to the N.E., the other to the N.W., and respectively afford shelter for boats from east and west winds, on sandy bottom; but the shore is rocky. A short distance from the coast the depth is from 13 to 22 fathoms. The coast N.E. of the point is higher, and in places covered with vegetation, but generally bare, showing the light-coloured rock of which it is formed. The beach of Santa Justa is at the head of a bay, and a chapel of the same name stands on the shore, close to the rocks on the western part of the beach. At a short distance eastward of Santa Justa beach, separated by a rocky ridge, is a more extensive beach, but it is foul, with a heavy sea on it.

The coast between the heights of Santa Justa and Calderon point is foul and rocky. At 2 miles west of Calderon point is Carrastrada point, with outlying rocks, the coast between being cliffy, with ravines. At a moderate distance from the shore the church of San Pedro is seen standing between the points, on a hill near the shore, conspicuous on account of its tower and isolation.

SAN VICENTE de LUAÑO.—The bay of Luaño is choked with sand, and has a clean extensive beach. A small river descends

through a ravine over the beach to the sea. On Ruiloba or Luaño point, at the west extremity of the bay, is the hermitage of San Vicente, and on the heights above and a little inland stands the town of Ruiloba. To the eastward of the point, and the rocks which surround it, fishing craft find shelter from westerly winds. A vessel under the necessity of running ashore to save the crew, should, if possible, select the middle of Luaño beach, and at high water. It is seen at a long distance, and is the only beach of any extent between San Martin de la Arena and Comillas. The coast between Carrastrada point and San Vicente de Luaño, 2 miles to the west, is low, but higher near Carrastrada point.

Remedios point.—One mile westward of Ruiloba point is Remedios point, salient, with a reef extending a short distance from it. Two large caverns, which are remarkable from their dark colour, appear in the cliff, east of the point. The church of Nuestra Señora de los Remedios, conspicuous from its size and isolated position, stands on a hill above the point a short distance from the shore. It is a good mark for the port of Comillas.

A little west of Remedios point is Miradorio point, which is rocky and of moderate height, with reefs extending some distance from it. Between this point and Puerto Comillas, west of it, there is a bay with a narrow beach fronted with reefs. A small stream of water falls into the bay, and east of it, close to the shore and the base of the cliffs of Miradorio, is a calcinating establishment, from which the mines are but a short distance.

TORRIENTE and LUAÑO BANKS.—The eastern bank, named the Torriente, is about one cable in length N.W. and S.E., with 10 to 12 fathoms least water over it, 45 to 55 fathoms, mud, on its north edge, and 27 to 41 fathoms between it and the shore. It lies $3\frac{1}{2}$ miles from the coast, and from the least depth on it Cabrera island bears E.S.E.; the beach of Luaño, S. by W. $\frac{1}{2}$ W.; cape Oyhambre, W. by S.; and mount San Cosme, W. $\frac{1}{2}$ S.

Luaño bank.—The westernmost bank, called the Luaño, 2 miles W. $\frac{1}{2}$ S. of the former, is of small extent, with 11 to 14 fathoms water over it, and having on its outer edge 35 to 45 fathoms, increasing to 55 fathoms, muddy bottom; between the bank and the coast there are from 27 to 32 fathoms, sand and rock. From it Cabrera island bears E. by S. $\frac{1}{2}$ S.; the beach of Luaño, S. $\frac{1}{2}$ E., and mount San Cosme, W. $\frac{1}{2}$ S. It breaks with much sea from the north-west, and the breakers are very heavy. The Torriente is equally dangerous; but a vessel may pass over either bank in fine weather.

PORT COMILLAS.—The small port of this name is in a little bay on the east side of Cabildo point, which is rugged with a reef extending to the north-east, affording some shelter to the bay ; there are also several detached rocky ledges, which dry at low water, on the south-east side of the point, extending over 2 cables into the bay. There is a signal staff on the point, and the village of Comillas stands on a hill about half a mile south of the point.

A small port is formed in the bay by two piers, enclosing a space sufficient only for fishing craft of the neighbouring coast ; it is entirely dry at low water, and the bottom is muddy sand ; the entrance is about 8 yards wide.*

The channel to the port is narrow, tortuous, and shallow ; it is bordered by reefs, and can only be taken in moderate weather with the assistance of a pilot and boats.

There is much swell in the port when there is any sea outside, although the entrance is somewhat protected by a kind of half gate formed of strong wooden bars. Two white conical pillars are placed on the heights, and when in line lead to the middle of the bar. At night when the weather is bad, each pillar is lighted, and also a temporary fire is made as a guide for the fishing craft.

At a moderate distance from the shore the establishment for calcinating minerals, standing 6 cables E.S.E. of the mouth, is easily seen, the chimneys of which, and surrounding worksheds, render it conspicuous, and are the only buildings of the kind to be seen on the whole coast. At the same time the walls of the mole, the masts of the vessels inside, and the village scattered over a hill will be observed. To the westward of the port, cape Oyhambre, the sands of Meron and Rábía, and the heights over the inlet of San Vicente de la Barquera are good marks ; whilst to the eastward are the islands at the mouth of San Martin de la Arena, the sands of Luaño, the town of Suances, and the white lighthouse on Torco de Afeura point.

The mariner will observe that the village of Comillas is to the eastward of the extensive sands of Meron and Rábía, and that San Vicente de la Barquera is westward of the sands.

Depth of water.—Vessels as large as 120 tons burthen enter the port for minerals, but it is inconvenient for those of more than 70 or 80 tons, ten only of which are admitted at the same time.

Tides.—It is high water, full and change, at Comillas, at 3h., and springs rise 12 feet.

* See Admiralty plan :—Comillas anchorage, on sheet of plans. No. 710.

Moria point, at a short distance west of Cabildo point, is low and cliffy, and surrounded by reefs, which extend a considerable distance off. The most dangerous of these is called the Moro, and the breakers on it are extensive. Between this point and the islet of Rábía, west of it, the shore is of sand, broken by rocky points. The coast westward to San Vicente de la Barquera is low and undulating, but high in the interior.

CAPE OYHAMBRE, $2\frac{1}{2}$ miles westward of Moria point, presents to the N.N.W. a face of a mile in extent, with small hills and whitish cliffs; the former are from 150 to 170 feet above the sea. It is also known by the sands of Meron on the west, and the sands of Rábía on the east. Nowhere on the coast, from San Martin de la Arena to cape Prieto, are the sands so extensive and so close together.

From the western extreme of the cape, reefs extend in a N.W. direction for a distance of about three-quarters of a mile; and from the eastern side others of no less importance extend in an E.N.E. direction. From the face of the cape several rocks and reefs extend off, on the outer of which at times there is a considerable north-west sea. There are 17 and 18 fathoms water 2 miles from the cape. In bad weather a berth of 3 or 4 miles should be given to it.

La Molar.—On the eastern reef there is a conical rock of this name, on which the sea frequently breaks, and when it does, it breaks also on Comillas bar. The fishermen watch for the breakers on La Molar to know the state of Comillas bar.

Rabia bay.—On the east side of cape Oyhambre the coast bends in to the south-east, forming the bay of Rábía, which is surrounded by a beach of nearly the same extent, whiteness, and elevation as that of Meron, west of the cape. The bay is so encumbered with rocks that there is only one part of it clear, which is near the cape, and for which the fishing boats make in strong winds from N.W. to S.W. when they cannot approach their own ports; but for a stranger to go between the reefs it would be necessary to have the aid of a pilot.

An inlet named Rábía is formed at the eastern extreme of the sandy beach. Its bar is changeable and dry at low water, but within, small craft lie afloat. A long low islet lying east and west fronts the bar, and at low water is surrounded by sand. Vessels enter the inlet to load with building wood for La Barquera. It should be approached at the west end of the islet at high water and in fine weather, for the bar breaks with the least sea on; vessels go up to the bridge of Rábía, which crosses the inlet, for the road to Comillas. There is no

village, but a house or two close to the bridge. To the eastward of the islet is Cabrero point, which is steep, with a reef extending to the north-west.

Meron sand.—From the west side of cape Oyhambre, the extensive white sands of Meron (*sable de Meron*) extend $1\frac{3}{4}$ miles westward fronting mount Braña, and terminating within and nearly choking up the inlet of Barquera.

SAN VICENTE de la BARQUERA is a large inlet on the south-west side of cape Oyhambre. It runs to the south-west, and is divided by a rocky height into two arms; the western called *Ria del Peral*, and the southern that of *Villegas* or *Barcenal*. The first extends more than $1\frac{1}{2}$ miles inland, and leads past the bridge of Nuevo or *Tras San Vicente* with its nine arches to the *barrio* or district of *Entrambosrios*; whilst the other arm runs about 3 miles in, and leads to the *barrio* of *Barcenal*. By the latter arm, flat-bottomed craft go up to the factories with iron, under the bridge of *Maza* with its 32 arches, and 1,594 feet in length.*

The town of San Vicente de la Barquera consists of two parts, an old and a modern. The old houses stand on the crest of the rocky height which divides the inlet into two arms, and the modern part stands on the eastern slope, extending to the edge of the sand, and so close that the sea occasionally reaches the doors of the houses. On the highest part, where the old town stands, is a handsome conspicuous white church, 230 feet above the sea, and the remains of a castle.

Point de la Silla, a low rocky point with a stone light-tower upon it, 140 feet high, lies on the west side of entrance, and between it and another point named *Castillo*, one cable southward of it, there are isolated rocks, which cover at high water. Half a cable off *Castillo* point is the rocky islet of *Callo* or *Peña Mayor*, 50 feet high, and 160 yards in length; in bad weather the sea washes over it. The islet is connected with the point by a reef with only 3 feet over it at low water, which however forms the western passage into the inlet, and is used with north-west winds by passing close to the west end of the islet.

Another islet called *Peña Menor* lies E. by N. $\frac{1}{2}$ N. of *Callo*, the space between being dry at low water; and half a cable north of the latter islet is the *Plancha* rock, awash at low water springs.

* See Admiralty plan:—San Vicente de la Barquera, No. 725; scale, $m = 8$ inches.

Depth of water.—Between the above islets and rocks on the north, and the sands of Meron, bordering mount Braña, on the south, is the eastern passage into the inlet, which is used with north-east winds. The sands of Meron are dry at low water springs, and form various banks with channels between them; the sand is gradually drawing towards Callo islet, and threatens at no distant period to unite with it. The depth of water east of the islet is therefore constantly decreasing, and requires frequent examination. The inlet in former times was resorted to by vessels of large draught, but as it is now almost choked up with sand, it is frequented only by vessels of 9 to 11 feet draught. The western or Peral channel is most frequently used, and at high water there is sufficient depth for vessels of 11 to 14 feet draught to proceed as far as Nuevo bridge, where there is a hole or well large enough for two or three vessels to lie afloat, secured head and stern. The only inconvenience is the swell when it blows hard from north-west.

Directions.—In entering the inlet, whether passing either east or west of Callo, it is necessary to keep the islet aboard. The long mark given for steering in eastward of Callo islet is the church of San Vicente de la Barquera, in line with the south side of the islet. The long mark for going in westward of Callo is the ruins of an old house called Maza, in one with the west end of the islet.

The breaks in the Tinas, page 212, are good marks for vessels from the westward for San Vicente de la Barquera, and also mount San Cosme or Rabo del Cabo, as it is called by the country seaman. To the eastward of the Tinas the land declines, and terminates in the low rocky points of Silla and Castillo. The inlet may be entered with the wind from any quarter but the south-west. It should not be attempted till half flood or nearly high water, according to the vessel's draught, and never on the ebb. When the state of the weather prevents the pilots from going outside they remain under the lee of Callo islet, and direct the course of the vessel as usual by means of a flag.

A stranger should have the aid of a pilot.

Mounts Escudo and Burgon.—The mountain of Escudo, rugged and barren, running east and west, rises inland southward of Barquera to a peak 3,288 feet above the sea, and bears S. by W. $\frac{1}{4}$ W. from the summit of mount Boria, on which there is a square watch tower, Mount Burgon, forming a cone 1,051 feet high, 3 miles southward of Barquera, will also be recognized.

These mountains are good distant marks for vessels proceeding for Barquera, and as the land is approached, the islets of Callo and

Peña Menor, and the white sands of Meron will be seen. There are no other sands of large extent except to the eastward.

LIGHT.—On point de la Silla, at the west side of entrance to San Vicente de la Barquera, is exhibited from a white stone tower at an elevation of 142 feet above high water, a *fixed red* light, visible in clear weather from a distance of 9 miles. The light is visible between the bearing S. 62° E., through South, and N. 62° W.

Tides.—It is high water, full and change, at San Vicente de la Barquera, at 3 h. 15 m.; springs rise 10 $\frac{3}{4}$ feet. With strong winds from S.W. round by West to North, the water rises 2 feet above the ordinary level, and the winds from N.E. to S.E. cause a depression to the same amount. The ebb stream runs 3 knots per hour at springs, and 2 knots at neaps.

Pellereso point (lat. 43° 25' N., long. 4° 28' W.).—Between Silla point at the entrance to Barquera, and Linera point, one-third of a mile north-westward, the coast is bordered at the distance of nearly a quarter of a mile by a ledge of rocks with one to 2 feet water over them, and which uncover at low springs; there are 5 fathoms close to them, and 2 $\frac{1}{2}$ to 3 $\frac{1}{2}$ fathoms between the ledge and the shore. Linera point projects to the N.W. from mount Boria, a ridge of some 350 feet high.

Pellereso point, about 2 $\frac{1}{2}$ miles westward of Silla point is low and steep; the land eastward of this point descends in gentle declivities to a low undulating coast, but to the westward the part intersected by the Tinas inlets is high and level, and specially marks this part of the coast. The high land in the interior, to the eastward, is not so rugged, nor have the mountains so many peaks as those to the westward.

Between San Vicente de la Barquera and Llanes there is a large extent of level coast some 650 feet high, with three breaks or ravines nearly equidistant from each other, the middle and most conspicuous one being the Tina Mayor. Between it and Tina del Oeste or Santiuste, over the table land of the coast, is the village of Pimiango, and on a slope of the hill, not far from the shore, is the hermitage of San Emeterio.

The False Tinas is a name given to some breaks in the bay of San Antolin, ria de Niebro, and the bays of Celorio and Póo, which appear like the real Tinas. The land of the coast about these points has much the same appearance, and in bad weather the higher land of the interior cannot be seen, but the Tina Mayor at a moderate distance will be known by the light-tower on San Emeterio point.

TINA MENOR or del ESTE.—At two-thirds of a mile westward of Pellereso point is the entrance to the inlet of Tina Menor, or del Este, which trends, with high land on either north and south, through a channel $1\frac{1}{2}$ cables in breadth, and three-quarters of a mile in length, when the inlet widens out, and at high water appears of considerable extent; but at low water it is nearly dry, with a shallow winding stream about 40 yards in breadth between the banks of mud and weeds.

The bar is dry at low water, and the inlet is only used by boats. The small village of Pesués stands on the western side a short distance within the mouth.

Pechon point.—To the westward of Vigia point, on the west side of entrance to Tina Menor, is a rugged islet, off the east end of a small bay, with a shingle beach. The steep point of Pechon follows, and the village of the same name stands on the north slope of a hill midway between the Tinas Menor and Mayor. The land over the shore is high and level, like that between Tina Mayor and Santiuste, but as it descends it becomes uneven, and terminates in cliffs. Close to the entrance of Tina Mayor there is a beach of white sand, and at the western part of it is the east point of entrance to the inlet, with rocks off it, several of which uncover at low water. The bottom is rocky, and there are about 25 fathoms water less than 2 miles from the shore.

TINA MAYOR.*—The entrance to this inlet, about $2\frac{1}{2}$ miles westward of Tina Menor, is open to the north, and less than three-quarters of a cable in breadth, with high steep hills on either side. About three-quarters of a mile within the entrance the elevated land recedes on both sides, leaving between a spacious cultivated plain, through which the river Deva runs into the inlet.

The village of Bústio stands on the western side of the Deva, about $1\frac{1}{4}$ miles within the entrance of the inlet. Beyond the village the high land closes and forms a narrow valley, through which the river runs.

The exports are iron and timber. There are no supplies.

After a north-west gale the inlet is often closed by sand-banks, but the pent up water of the Deva soon forces the usual passage. The freshes of the river, however, cause in some places an accumulation of gravel, which uncovers at low water, narrows the channel through which vessels have to pass, and at about a quarter of a mile within the entrance, between the gravel and western shore, it is only

about 30 yards in breadth. From the east point of entrance rocks extend northward $1\frac{1}{2}$ cables, and those nearest the shore dry at low water. With strong north-east and north-west winds flaws and eddies blow over the high land which forms the entrance, making it difficult to enter; and on these occasions the sea breaks heavily on the bar. It should not be attempted when the freshes are strong, which will be known by the discolouration of the water.

It is easy to leave the Tina Mayor, for the land wind never fails about daylight, and enables a vessel to get clear of the coast.

Depth of water.—Vessels of only 9 to 11 feet draught frequent the inlet, although those of 13 to 14 feet can enter under favourable circumstances; they lie aground at low water on soft mud, about half a mile from the entrance. Small vessels go as far as Bústio, where there is a well or hole with 6 feet in it at low water; but it can only be reached at high water, for a shingle bank in the channel dries at low tide.

LIGHT.—On San Emeterio point, about $1\frac{1}{2}$ miles westward of the entrance to Tina Mayor, is a conical white tower, which exhibits, at an elevation of 223 feet above high water, a *fixed white* light, visible in clear weather from a distance of 15 miles.

Tides.—It is high water, full and change, at the entrance to Tina Mayor, at 3h.; springs rise 11 feet. The tide is felt as far up as Molleda, a village on the eastern bank of the Deva, a little above Bústio, and where the flood tide only lasts for 2 hours, being overcome by the river stream. The ebb stream runs from 3 to 4 miles an hour at Bústio, whilst the flood is scarcely perceptible.

The Deva and its tributary, the Cares, discharges a considerable quantity of water into the sea, the stream running at not less than 7 or 8 miles an hour during the freshes, and between 2 and 3 miles on ordinary occasions. In the spring and until the month of July, if the snow during winter has been heavy, the freshes are strong.

Water from the Deva may be used by shipping in any part of the river at low tide, as it is fresh nearly to the entrance.

TINA del OESTE.—The coast westward as far as the west Tina is formed of cliffs and small shingle beaches. The last of the Tinas or great bays is called Tina del Oeste or Santiuste. It extends to the S.W., but is completely choked with sand and gravel, so that only small craft and boats can cross the bar at high water. The little river Cabra falls into the sea at the west end of the beach. The islet of Castron de San Yusti lies in the entrance of this Tina,

but nearer the western coast; it is connected with the shore by reefs which scarcely cover at high water. When the islet bears about S.W. $\frac{1}{2}$ S. the bay is open, and an extensive sandy beach is seen, conspicuous from its whiteness in contrast to the dark rocky shore.

Balloto point, nearly 5 miles westward of Tina del Oeste, is level, and projects to the N.N.E., forming a sandy bay on either side of it. About a cable off the point is an islet of the same name, nearly the same height and appearance as the point, flat, and steep on all sides, with a passage between it and the shore for small craft. When the islet is in one with the point bearing S.W. $\frac{1}{2}$ S., the two sandy beaches are visible, the larger being to the eastward.

One mile eastward of the islet is the little bay of Puron, and a rivulet of the same name runs into it, and a mile farther east is Vidiago point, with the village near it.

To the eastward of Vidiago point is a small shingle beach, and next to it is Pendueles point, which is steep and rocky.

There are one or two small islets and rocks close off this part of the coast, and it should be given a wide berth.

Santa Clara point.—The coast immediately east of Llanes is formed of cliffs, which are washed by the sea, the interior being high, mountainous, and barren. Santa Clara point, which projects to the northward, is $1\frac{1}{4}$ miles from Llanes. Close westward of the point, and near the shore, there are three islets called Canales, and another islet, connected to the shore, called Toro or Manuela, lies westward of them.

LLANES.—This small port, formed between Calaverojondo and Caballo points, admits coasters of about 6 feet draught, and its mouth is opened to the eastward. About 65 yards eastward of Caballo point is a rock named Osa,* which uncovers at low water springs. Between the rock and the point there are $2\frac{3}{4}$ fathoms water, sand; and between it and the opposite shore 3 to $3\frac{1}{2}$ fathoms.

Directions.—A vessel may enter the harbour, the interior of which is dry at low water, on either side of Osa rock; the eastern channel is the wider, but not so easy to navigate. To enter by the western channel, bring a chapel standing on the south side of the entrance of the port in line with another chapel seen on a height bearing S.W. $\frac{1}{2}$ S. nearly. The port should be entered with a smooth sea, and a stranger should have the aid of a pilot and the assistance of a boat, as the channel is narrow and winding.

*A beacon is to be erected on Osa rock.

The little river Carrocedo empties itself in the port.

Life-saving apparatus.—There is a life-saving apparatus at Llanes.

LIGHT.—On San Antonio point, on the southern shore of the mouth of the port, is an octagonal white lighthouse, which exhibits, at an elevation of 64 feet above high water, a *fixed green* light visible, in clear weather, from a distance of 9 miles.*

Aspect.—The peaks of the mountains named Urrieles de Llanes rise 8,900 feet above the sea, 12 miles south of the town, and are good distant marks for it. Naranjo de Bulnes, 8,622 feet high, is one of the most remarkable points of the chain, from its isolation, barrenness, and pyramidical form. Between the Urrieles and the coast there is another chain of mountains, not so high as the former, named Sierra de Cuera, extending east and west, with a remarkable peak rising above the middle of it called Mojon, which is about 3,060 feet high, and less than 5 miles south of Llanes. The Mojon and Naranjo de Bulnes in line lead to the entrance of Llanes.

On approaching the coast the town of Jarri will be seen on a height, and the pilots' watchhouse, which is round and white, on San Pedro point, westward of the town; the church of Guia on a height eastward of the town, and the white lighthouse of the port.

Palo de Pó islet.—The bay of Pó, next west of Llanes, is somewhat larger than that of Celorio, which is $1\frac{1}{2}$ miles further westward. It has a beach through which the rivulet Guera runs into the sea, the mouth of which is entered by small coasters at high water. The town of Guera is a little inland and visible from seaward. Off the eastern part of Pó bay there are some islets; the outermost and most remarkable is called Palo de Pó. It has the form of a pyramid, and seen either from east or west appears like a ship under sail. It may be approached to a short but prudent distance.

NIEMBRO INLET, on the east side of cape Prieto, runs south and south-west for 3 cables to a beautiful fine sandy basin on the N.W., and another to the S.E. The entrance is about two-thirds of a cable wide between Cueva Ladrona point on the east, and Borizo point on the west. Keep mid-channel and steer by the light colour of the bottom; the rocks on either side show by their dark colour.

The best berth is to the south-east, near the church; the passage in is between the islets.

* This light is not to be depended on.

The village of Niembro is in the N.W. angle of the basin. The belfry of the church alone is seen outside when north of the entrance. The little river Niembro discharges itself between the two basins, and the water is good for drinking.

Depth of water.—The channel varies from about 45 to 110 yards in breadth, with only 8 feet at the entrance at low water, when the interior is dry. The bottom is a muddy sand, on which coasters of about 7 feet draught ground, having entered the inlet at high water.

Tides.—It is high water, full and change, at Niembro inlet at 3h.; springs rise about 11 feet. The interior of the inlet dries at three-quarters ebb, so that the greatest rise of water above the ground is from 8 to 9 feet within the basin, and a little more in the channel leading to it. The stream is said to run out about $1\frac{1}{2}$ miles an hour.

Borizo island, at a short mile eastward of the Niembro, is nearly circular, steep on all sides, flat, and about the same height as the point to which it is connected by reefs, over which there is scarcely water for a boat. There are two small islets on its western side. To the eastward of Borizo is the little bay and islet of Celorio. The town of this name, with 500 inhabitants, stands a little way back in the interior, but a convent only is seen from the sea, and near it an old Benedictine college on a cliff of the coast. Two islets like Borizo lie a short distance from the shore east of Celorio.

CAPE PRIETO.—Jarri point, west of Llanes, is salient and steep, with a look-out house on it and a small bay on the eastern side. Cape Prieto, 4 miles to the westward, is of moderate height, with a gentle slope to the sea, terminating in steep rugged rocks, which are only seen when near, and east or west of the cape. The north face of the coast forming the cape rises from the east end of San Antolin beach, and terminates to the E.N.E. in a projecting rocky point, which is the real cape. On a hill over it are the remains of a look-out tower. In the front of the cape there is a strip of clean beach at the head of a small bay, and some rocks, which appear isolated at high water, lie along the shore of the cape.

Dangers.—A rock named Baca lies E.N.E., distant $1\frac{1}{2}$ cables from the cape, and uncovers at low water. It is dangerous when covered with smooth water, but when there is any sea it breaks. There are $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms between the rock and cape, and coasters use the channel in fine weather. One cable south of the Baca is a small islet called Peyes, and from it a reef extends westward, showing a head at low water, which then appears like an islet; there are

4½ to 5½ fathoms water between it and the Baca. There are several other islets and rocks to the south-west or inshore of the Baca, with channels between them for boats; and a clean sandy beach named Toranda, between cape Prieto and the mouth of the Niembro, sheltered from the north and north-west seas by the above rocks and which serves as a refuge for fishing craft.

San Antolin beach.—To the westward of cape Prieto and eastward of Huelga point, which projects a little, there is a small islet, and the shore to the eastward is low and rocky as far as San Antolin beach, which is about one mile in extent, and terminates at Pistaña point, a short distance off which there is an islet. The beach is of shingle and sand of remarkable whiteness, and conspicuous at a distance. It is scattered with rocks at either end, which extend 2 cables from the shore, and uncover at low water, having a beach of 2 cables between them.

The river Bedon or San Antolin falls into the sea near the west end of the beach, and in winter is a large stream. The ravine through which it descends may be seen at a great distance.

Many navigators in a gale have sought this beach for safety, and have lost their lives in consequence of not being aware of the above rocks. The convent of San Antolin, the only building near the beach and east of the river, in line with the road on the summit of a ridge, leads between the rocks; the beach of San Antonio, near cape Mar, should, however, be preferred, as it is less flat, clean, and of fine sand, and off which vessels may anchor under favourable circumstances, and be sheltered from north-west and westerly winds. The winds from north to east blow on to the beach, but life may be saved even under these circumstances.

CAPE de MAR (lat. 43° 30' N., long. 4° 57' W.) is low, steep, and projects to the N.E. It is easily recognized in running along the land, but difficult to make out from seaward, as it then appears blended with the cliffs near it. It is bold, and may be approached to a moderate distance, but there is much sea off it in bad weather. On the east side of the cape the shore forms an angle with a little beach named San Antonio del Mar, where fishing craft resort when surprised by a westerly or north-west gale. The land near the coast eastward of the cape becomes higher, and the rugged peaks in the interior are covered with snow.

Nueva river.—The coast from cape de Mar forms a slight bay westward for about 2½ miles to the Nueva river, which passes near the town of the same name; it falls into the sea through a small

clean sandy beach named Cuevas de Mar. Fishing boats find refuge in the river during bad weather, entering at high water; it is easily distinguished by the ravine and white beach, being the only one between cape de Mar and Rivadesella. A little westward of it is the islet of Orcado de Cuebas, a short distance from the shore, but the channel between is foul and rocky.

About 2 miles westward of the Nueva is the mouth of the little river Guadama; its eastern point is a high, bold cliff, and the southern low. Between the two rivers is a small cape called Villanueva, and the village of the same name is near it.

A rescue station is maintained at Villanueva.

RIVADESELLA HARBOUR.—The entrance to this harbour is 4 cables wide, and lies between mount Guia or Corbero on the east, and monte Somos, which is somewhat higher, on the west. Between these two hills the shore is of white sand, called Santa Marina, which in the form of a crescent nearly connects them. A narrow channel, varying in breadth from about 55 to 90 yards, and carrying from 8 to 21 feet at low water, runs along by a mole on the southern side of mount Guia to the town, and the western side of the channel is bounded by the Santa Marina, and other detached banks. The north shore of mount Guia is rocky, and a reef with 5 feet over it at low water, extends from Caballo point, its north east extreme; in entering the port therefore it should be given a wide berth.*

The only part of the mole seen from seaward is its high solid head, with the flagstaff; it abuts against the cliffs which descend from the heights, on which stands the temple of Guia, and is therefore easily recognized.

When there is much sea from the north-west it breaks between Caballo point and the mole head, which renders the entrance almost impassable. In case it should be absolutely necessary to enter, good way should be kept on the vessel so as to keep before the sea. About 3 cables within the bar there is ample security in 21 feet at low water, where vessels generally moor or secure to the mole. Small vessels go farther in, and should they take the ground at low water the bottom is soft. To the southward of the town different channels are formed through the banks of mud and sand.

The chief exports of Rivadesella are staves and nuts, but the trade is small.

* See Admiralty sheet of plans, No. 725.

Depth of water.—Between the mole head and the edge of Santa Marina sands is the bar of the inlet, with about 8 feet over it at low water springs, and 21 feet at high water; at neaps there are 11 feet at low water, and about 17 feet at high water.

Directions.—In entering the harbour steer midway between the points of entrance, and then direct for the flagstaff, passing about 35 yards from the mole head, and then proceed along by the mole. When the freshes are running strong the water is discoloured, and a sailing vessel should not enter without a commanding breeze. In winter moor head and stern, with the vessel's head up the harbour, and the cables made fast to the mole so as to be better secured against the freshes. In summer, vessels can lie with their heads to seaward. The swell caused by a north-west gale is inconvenient to vessels moored in the outer part of the port.

Tides.—It is high water, full and change, in Rivadesella harbour, at 2h. 54m., being somewhat retarded or accelerated according to north-west or north-east winds; springs rise 13 feet. The ebb stream runs 2 miles an hour at springs, and increases to 5 or 6 miles with the freshes from the Sella; at neaps it runs 1½ miles an hour.

LIGHTS.—On mount Somos, at the western side of entrance to Rivadesella harbour, is a white rectangular lighthouse, with a square tower, which exhibits, at an elevation of 370 feet above high water, a *fixed white* light, varied by a *flash* every *four minutes*, and visible in clear weather from a distance of 15 miles.

From the head of the mole, northern side of entrance to the harbour, is exhibited, at an elevation of 25 feet above high water, a *fixed red* light, which should be seen in clear weather from a distance of about 2 miles. The light is obscured eastward of the bearing S. 12° W.

A life-saving apparatus is maintained at Rivadesella.

Mount Guia, named also Corbero, is 349 feet high, and is easily recognized by its dark colour, and its isolated position, (being connected to the main by a narrow neck of land), and also by the white chapel of Guia, situated on a height of 175 feet over the mole head of Rivadesella. To the eastward of the mount the coast is low, with broken cliffs, rising to high land in the interior. The islet of Palo Verde, of moderate height, in the form of a pyramid, is about three-quarters of a mile eastward of the mount, 55 yards from the shore, and the passage between carries from 7 to 9 fathoms, rock.

Mount Carrandi, 8 miles W.S.W. of Guia, is remarkable from its peaks, and its eastern slope terminates near Rivadesella, so that when bound to this port it will be sufficient to steer for the lowest visible part of the slope of the mountain.

Another rugged mountain, with its peaks covered with snow the greater part of the year, will be seen terminating S.S.E. of Rivadesella; it is called Peña Santa, and its summits reach 8,670 feet above the sea; seen from the northward it has the same appearance, from its rugged resemblance, as the mountain of Monserrate.

Mount Somos.—An arm of land extends eastward from Carreros or Sierra point, and terminates by a rapid descent in the entrance to Rivadesella. Its north-east extreme is named Somos or Berguiz point, and the whole of it forms mount Somos. On the north it presents reddish cliffs, and its available ground for cultivation is of the same colour; it is 343 feet above the sea, and on one of its heights, close to the entrance of Rivadesella, is the lighthouse.

SARRAPIA BANK is about half a cable in extent, east and west, with 8 and 9 fathoms water over it, lying rather more than one mile north of mount Guia, and when there is any sea, the breakers on it are extensive. Between the bank and the shore, there are from 14 to 18 fathoms, rock, and the same depth a short distance outside it, deepening rapidly seaward. Although the water inshore of the bank may not break, vessels should pass seaward of it when there is any sea. From its west end, cape Lastres bears N.W. by W., and the chapel of Guia S.W. $\frac{1}{2}$ S.

Carreros point and reefs.—Carreros point is steep, and projects northward, and about one mile north of the point there are several reefs with $3\frac{1}{4}$ to $5\frac{1}{2}$ fathoms water over them. There is a channel between the reefs and the point, which admits coasters. With a strong north-west wind the sea breaks heavily on these reefs, and a berth of at least 2 miles should be given to the point.

Mount Carrandi.—A high and rugged mountain, named monte de Carrandi, with a town on its northern slope, rises S. by W. from Lastres, 5 miles inland. It extends E.N.E. and W.S.W., with well defined declivities towards these points, and it slopes to the sea shore between Penote and Carreros point. Its summit is a series of conical peaks, the largest of which, called Pico de Sueve, is over 3,709 feet above the level of the sea; and its form and dark colour render it conspicuous at a distance. Spurs from this mountain take a northerly direction, and descend gradually to the sea, terminating in Carreros, Arrobadó, and Atalayá points.

Between the two points, Carreros and Arrobadó, there is a beach, called Arenal de Vega, occupying a large portion of an extensive bay, and between the points Arrobadó and Atalaya is the Arenal de Moriz. The coast here is much indented, and the shore foul; it may, however, be approached to a moderate distance. To the eastward, and inland of mount Carrandi are rugged and broken mountains, interspersed in great confusion, and with them the peaked crests of the Pyrenean chain, almost always covered with snow, are seen over 60 miles at sea.

The point of Atalaya, with that of Isla, about one mile westward, forms the entrance of a bay which recedes to the south, at the head of which are the extensive sands of Espasa.

The village of Espasa is a short distance from the sea, on the bank of the river, which runs through the middle of the sands. In summer, coasting vessels embark charcoal at this place.

CAPE LASTRES projects northward, and is known by its level surface, and by its sudden slope to the sea. Its north face is of reddish cliffs, and at its foot, about half a cable from the shore, is a rock called Vaca, which uncovers at low water. Small craft may pass inside the rock. Reefs extend some distance from the cape, and in north-west gales the sea breaks over a mile from the coast.

Plancha rock.—About $1\frac{1}{2}$ miles south-east of the cape is Misiera point, off which, at the distance of one cable, is the Plancha rock, with 5 fathoms water over it; the rest of the coast is of cliffs, and clear of danger.

Lastres bay.—The little bay of Lastres, south of Misiera point, is sheltered from north-west and westerly gales. At the village there is a small indifferent mole, which affords some little shelter to the fishing boats. Vessels occasionally take shelter here from north-west winds, and when unable to enter Rivadesella on account of the sea or want of water.

Anchorage.—The best anchorage is in 6 and 7 fathoms water, mud, with cape Lastres in line with Misiera point, and the Pico del Medio seen to the south-west in line with the hermitage of San Telmo, south of the village, and half-way up the slope of a hill. A vessel from this anchorage would probably clear cape Lastres if caught in a north-east gale.

Colunga river.—At about two-thirds of a mile southward of Lastres, the little river Colunga runs into the sea over a small sandy beach. At high water small coasters enter, and proceed as far as the bridge of Luz, half-way to Colunga, where they load with wood and other produce. The coast southward of Lastres becomes lower, but

to the east of the river Colunga is a height named Penote ; its base is washed by the sea, and it descends eastward and terminates in a cliffy point of little elevation, called Isla, from off which a reef extends and some of the rocks appear above water.

TAZONES BAY, between Rodiles and Tazones points, bends to the S.E., and is backed by high land, which descends rapidly to the sea, and in the middle of it is a break, and the village of Tazones. To the north of the village is a conspicuous white chapel, and below the village near the sea is an ancient tower. The shore of the bay is rocky, and in the middle of it is a small shingle beach, on which the fishermen haul up their boats, being the only craft belonging to the place. In the middle of the bay and in an easterly direction seaward, the bottom is clean sand, and good holding ground.

Anchorage.—Vessels of about 300 tons may anchor here in 6 to 10 fathoms water, with winds from N.W. round by west to S.E., as soon as the chapel and village are open of the land of Tazones point. A vessel taking the anchorage in a north-west gale should give the point a wide berth.

Buoy.—A white buoy is moored in 8 fathoms to mark the anchorage, and to which vessels can make fast for setting sail ; it is well moored, the holding ground is good, and it is sheltered by mount Faro.

LIGHT.—On Tazones point is a yellow rectangular tower, which exhibits, at an elevation of 220 feet above high water, a *fixed white* light, visible in clear weather from a distance of 7 miles.

VILLAVICIOSA INLET, which falls into Tazones bay, presents the appearance of an extensive lake, at high water, forming here and there bays and gullies, bounded by hills covered with trees, vegetation, and scattered villas.

On the western shore and about 4 cables from the bar is Piedora point, which forms the north extreme of the bay and anchorage called Barquero. The shore of this bay is composed of a shingle beach, and beyond San Telmo (its south point) there is another bay larger than the former, named Puntal ; but the whole of the channel and the anchorage within the gulf have considerably decreased in depth, and in the Puntal, where the soundings were formerly from 7 to 9 feet at low water, it is now dry, and until the works necessary to clear the channel have been carried out, vessels should not venture in, more especially with gales blowing into the gulf.

The town of Villaviciosa, containing about 20,000 inhabitants, stands on the eastern side of the inlet, about 3 miles from the sea,

and the river Viacaba falls into the inlet a little south of the town. The exports, are filberts, chesnuts, citron, coal, and lime ; and grain is imported.

There is steam communication with Santander and Coruña.

Tides.—It is high water, full and change, at the bar of Villaviciosa, at 3h ; and the rise is about 13 feet. In strong north-west winds the tide rises about 2 feet above the usual level of high water, and an hour or more later, whilst north-east and south-east winds depress it to the same amount. The stream at springs runs about 3 miles an hour, but more during the freshes.

Rodiles point.—From the bar of Villaviciosa the sands of Rodiles extend eastward to the foot of the mount of the same name. The mount is high and isolated ; it is connected to the main by a neck of low land, and a rocky point projects to the N.W. from its foot. Between the point and cape Lastres is the bay of Conejera, and the coast is foul. During fine weather vessels usually anchor off the beach of Rodiles to await the tide for Villaviciosa.

COAST.—Tazones point, about 4 miles westward of cape Lastres, is high, and slopes suddenly to the sea. A wide rocky ledge, which at low water uncovers one cable off, extends some distance from it, which should not be approached too close. Olivo point is $1\frac{1}{2}$ miles westward of Tazones point ; it is high and salient, and appears the same east or west, but from the offing it is blended with the other land. A reef extends a considerable distance off Olivo point, and in a heavy sea should be given a wide berth, as in a north-west gale there are breakers over three-quarters of a mile from the shore. One mile north of the point there are 15 fathoms water, with rocky bottom. The coast between the point and Barqueta or Meron bay is covered with vegetation to the water's edge, but here and there it is of cliffs. It is clear of danger, and may be approached to the distance of a mile.

Barqueta bay is small with a sandy beach, and Entornada point, the western extreme is high and round, and projects seaward. Coin point, the eastern point of the bay, is high and steep, and small villages and extensive cultivated land with scattered houses are seen on the heights along the coast. The coast westward to the high land over cape San Lorenzo is of a regular height, terminating in cliffs, and skirted at the distance of half a cable by large detached rocks, which uncover at low water. At 2 cables outside the rocks there are 8 and 10 fathoms water, at one mile from 15 to 23 fathoms, and at 2 miles 30 fathoms, rocky bottom.

España bay, between Entornada and Peña Rubio points is one mile wide, and rather less than a mile deep; its shores are rocky, and in the middle of it there is sandy beach, through which the little river España falls into the sea. Peña Rubio is high, steep, and a little salient, and at $3\frac{1}{2}$ miles westward is cape Lorenzo, which projects northward, and terminates in a small dark steep hill. The extremity of the cape seen at high water east or west appears like an island. The land over the cape is high, and on one of the heights is a chapel in ruins, which, with another building on the higher part of the land, are good marks.

On the east side of the cape there are three low black rocks, named Estaño; they are half a mile from the shore, with $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms water between them, and 7 fathoms between them and the cape. Small vessels at high tide and in fine weather pass between and within them. Pedro bay, westward of cape Lorenzo, is obstructed by rocky beds covered with sand, and there is no anchorage. The low marshy land at the head of the bay terminates in a sandy beach, which is conspicuous at low water, and a reef extends a long distance from Cervignon point on the east side of the bay.

BAY of GIJON, between the hill of Santa Catalina, on the west side of San Pedro bay, and cape Torres, is 2 miles wide, N.N.W. and S.S.E., about a mile deep, and its western part affords shelter from westerly winds; but being quite open to the north-east, a vessel should be prepared to leave, in case the wind veers to the northward and blows hard, which it frequently does even in summer. These heavy onshore winds commonly last 2 or 3 days, and prevail from the north-east. Small vessels run for the basin of Gijon. Fishing vessels, when they cannot from the heavy sea take the bar, run for a little creek with a shingle beach, and protected by a reef, on the western shore of the bay, one mile from cape Torres and about $1\frac{1}{2}$ cables south of Arnao castle.*

Anchorage.—The greatest depth in the bay is 12 fathoms, which is at the entrance, the water thence gradually shoaling to the shore, over a rocky bottom; but near the cape patches of sand predominate. A good berth for large vessels is in 10 or 11 fathoms, sand, with the town of Candas (about 4 miles north-west of the cape) just shut in with Orrio islet, at the foot of cape Torres, and distant about 4 cables from the islet. Small vessels anchor in 8 or 9 fathoms, good holding ground, about a quarter of a mile off-shore, between a cove near the cape and Arnao castle; but at all times keep Olivo

* See Bay of Gijon, on Admiralty sheet of plans No. 77; scale, $m = 5$ inches.
SO 10809.

point well open of cape San Lorenzo, for shutting that point in with the cape will place a vessel on rocky bottom.

Buoys.—There are two mooring buoys in the roadstead south-east of cape Torres; the outer buoy is in 10 fathoms, $4\frac{1}{2}$ cables from the cape, and the inner buoy is moored in $7\frac{1}{2}$ fathoms, 6 cables from the cape; but the positions of these two buoys cannot be depended on, as they are liable to break away from their moorings in heavy weather. A warping buoy is moored 109 yards westward of the entrance to the port, and there is also a red and white buoy for mooring vessels in the new basin.

DANGERS.—Nearly all Gijon bay is bordered by a rocky flat, and its southern part is filled with rocky patches, which make the access to the basin difficult to a stranger.

The westernmost of these patches, named Osa, with 6 feet over it at low water, lies N.W. by W. from the light-tower on the hill of Santa Catalina, and distant nearly one mile from Santa Catalina point. It only shows at low water, when the weed is seen, and the sea breaks on it.

The Serrapio de Mar, or Outer Serrapio, is a rocky ledge with 12 feet over it at low water springs, from the middle of which the light-tower on Santa Catalina hill bears S. by E.; there are 6 fathoms between it and Santa Catalina point, from which it is distant 3 cables. When the sea breaks on this danger it also breaks on the bar, so that the pilots watch the surface of the water over it for taking the bar. The San Justo, the next patch to the south-west, and lying N.W. $\frac{1}{4}$ W., $3\frac{1}{2}$ cables from Santa Catalina point, has 15 feet over it, and is dangerous with a heavy sea.

The Serrapio de Tierra, or Inner Serrapio, is a rocky ledge which shows at half tide, and on which the sea always breaks. It is marked on its south-east edge by a beacon 246 yards N.W. from the red light on Santa Catalina mole, and, in connection with the reef extending from the mole, forms the bar. The beacon should always be passed on the eastern side, but vessels seeking the port without the assistance of a pilot should bear in mind the position of the north-east point of the ledge, which lies N. $\frac{1}{2}$ W., 120 yards from the beacon. Another rocky shoal, the Vendavel, no less dangerous than the preceding, but not so extensive, lies a short distance westward of the inner Serrapio, the two forming the Carrero channel. Separated from the beach in the southern part of the bay is the rocky height, nearly isolated and of small elevation, Coroño, between which and the town numerous rocks of all sizes uncover at low water, some of them a quarter of a mile from the beach.

Town of Gijon.—The small hill of Santa Catalina, with an old chapel on its summit, is 148 feet high, and joined to the main-land by a low isthmus. Its sides are precipitous, and on its southern slope stands the town of Gijon, with a population, at the last census, of 17,000. On the north-west part of the hill is the castle of Santa Catalina and the light-tower. The battery of San Pedro and its magazine stands on the east part of the hill.

Depth of water.—The entrance to the harbour, between Santa Catalina mole and the new mole to the southward, is about 109 yards wide, but at low water the harbour runs practically dry, some 6 feet of water remaining in the deepest parts. The Darsena, or Basin, on the western side of Santa Catalina hill, is $1\frac{1}{4}$ cables long, north and south, and half a cable broad, and will contain from 80 to 100 vessels of 50 to 200 tons burthen. It is surrounded by a stone wall, with an entrance 55 feet wide, open to the south-west. The basin dries at low tide, but will admit vessels of about 13 feet draught at high-water springs; at high-water neaps there are not more than 11 feet at the entrance.

It is recommended that vessels trading here should be strongly built, capable of taking the ground, and their keels plated with iron, for the bottom is rocky, and a swell sometimes sets in. The bottom is also rock outside the entrance, and some dangerous pinnacles show themselves at low water on the south of the bay.

A branch line from the Langreo railway is brought to this port for the conveyance of charcoal to vessels loading with it.

Trade.—The chief exports are copper ore, jet, and quicksilver, &c., valued in 1889 at £146,622; and the imports are grain, sugar, and machinery, &c., valued in 1889 at £282,149. 1,753 vessels entered the port in 1889 representing an aggregate tonnage of 245,155 tons. Trade is mainly carried on by coasting steamers, and there is railway and telegraphic communication to towns in the interior.

There is no dock accommodation, but repairs to shipping may be carried out alongside the quay, or on the wooden gridiron. There are several marine stores, and a marine engineering and repairing shop.

There are no special custom-house or quarantine regulations. There is a hospital for seamen.

Coal.—About 4,000 tons of coal are kept in store, but if required, the mines at Sama, which are connected with Gijon by two lines of railway, could produce from 1,500 to 2,000 tons of native coal daily.

The price of coal alongside the quay is 12s. per ton, and to vessels in the harbour 13s. 6d. per ton, stowed in the bunkers. There are three tips at the quay, alongside of which there are 13½ feet at springs and 11 feet at neaps; these tips can load from 1,200 to 1,500 tons of coal per day. At the Fomento quay coal is shovelled on board, and vessels load there to 14 feet at neaps and 16 feet at springs. Gijón being an open tidal harbour, the quays all run nearly dry at low-water springs. Dredging is in progress near the quays.

Water and supplies are plentiful; the former is excellent, and conveniently obtained from a fountain.

Pilots.—As no good leading marks can be given for crossing the bar, a stranger should always avail himself of the services of a pilot, especially if his vessel draws much water. Directly a vessel arrives off the port, a pilot goes out, and if the sea be such that he cannot cross the bar, he remains in the best place for receiving the vessel, and signals are made from the staff at the extremity of the mole for the direction she is to steer.

LIGHTS.—The light-tower on the hill of Santa Catalina shows, at an elevation of 167 feet above high water, a *fixed white* light, visible in clear weather from a distance of 10 miles.

A *fixed red* light is exhibited from an iron column at the extremity of Santa Catalina mole, elevated 28 feet above the sea, and visible in clear weather 7 miles. A small *red* light is also seen on the north mole of the basin when within the bar.

A *fixed white* light is exhibited, at an elevation of 19 feet above high water, from the end of Fomento mole.

A *fixed red* light is exhibited on the inner part of Fomento mole, and when in line with Santa Catalina mole light, leads across the bar; but as these lights are only 328 yards apart, it is necessary to use caution, so as to keep them in exact line.

The bar.—From Bocal point, the west extreme of Santa Catalina hill, a mole extends in a west direction, and between the shallow water off it and the Inner Serrapio, is the principal passage over the bar. This passage is much contracted by the Bar rock, which has 5 feet water over it, lying nearly in mid-channel, and by the Juan Sancho, a pinnacle rock, dry at low-water springs, which is a little detached from the north part of the Inner Serrapio. The greatest depth on the bar is 20 feet at high-water springs, and being narrow, vessels, if they have good way on, do not receive more than one wash or heave of the sea when crossing. None, however, should attempt it without being certain that there is water enough for them at the entrance of the basin.

Bad weather signals.—In bad weather the following signals shown from a mast on the top of the look-out of Santa Catalina, are used to direct vessels wishing to enter the harbour. The signals are made with black balls and flags, but the colour of the flags has no significance.

- | | | | |
|----------------------------------|---|---|---|
| 1. A square flag | - | - | Bad weather expected ; vessels in the outer harbour should return into port. |
| 2. A black ball | - | - | Crossing the bar is attended with difficulty. Vessels can either go into the harbour, moor under the lee of cape Torres, or proceed to sea. (Vessels entering the harbour when this signal is up will find the pilot inside the bar.) |
| 3. Two square flags | - | - | Impossible to cross the bar. |
| 4. Two black balls | - | - | Impossible to moor in the harbour. |
| 5. A flag over a ball | - | - | Vessels of light draught can enter. |
| 6. A flag under a ball | - | - | Heavy vessels can enter. <i>See</i> note below. |
| 7. A ball between two flags | - | - | Send a boat to Musel bay, to endeavour to embark a pilot. |
| 8. A flag between two balls | - | - | Communicate the signals to the vessel which does not understand them. |
| 9. A flag over two black balls | - | - | Wait for the tide before entering the harbour. (If this signal is repeated it means "wait until to-morrow".) |
| 10. A flag under two black balls | - | - | Signal the draught of the vessel, by dipping the national flag as many times as the draught of the vessel in feet ; by the steam whistle ; or by the International Code. |
| 11. Two flags over a ball | - | - | The outermost vessel is badly moored, and should come farther in. |
| 12. Two flags under a ball | - | - | The innermost vessel should go farther out. |

The national flag at the foremast denotes that the signal is understood.

The code flag at the mainmast denotes that the signal is not understood.

Vessels with one mast hoist the national flag if the signal is understood, and both flags if not understood.

Note.—When the sea is very heavy, so that vessels entering the harbour cannot see the signals made from the pilot boat inside the bar, vessels are guided in the direction of the channel by means of a flagstaff, furnished with an arm, placed on the pier of the new basin named Fomento de Gijon. A black board or a blue flag attached to the arm, if shown westward of the flagstaff, denotes that the vessel is to steer more to the westward; if shown eastward of the flagstaff, to steer more to the eastward; and when the board or flag is moved in line with the flagstaff, it denotes that the vessel is in the channel, and that the flagstaff should be steered for. The bar should be crossed as quickly as possible.

Tides.—It is high water, full and change, at Gijon at 3h.; springs rise 14 feet, and neaps 11 feet. With south-west and north-west winds an excess of 2 feet may be expected above the usual rise, and the reverse with opposite winds. The streams are weak, but when there is a heavy sea the eddies are strong in the channel and at the entrance.

A life-saving apparatus and life-boat are maintained at Gijon. There is also a landing apparatus under Arnao castle to assist the crews of the fishing boats to land in rough weather.

Directions.—Vessels bound to Gijon from the westward should, in bad weather, give cape Peñas a berth of 5 or 6 miles, to avoid the heavy sea off it. With south-west winds they may pass between the cape and the Somos Llungo shoal, or even borrow on the Romanella rock if the water be smooth; for as soon as the cape is doubled the wind will become scant. If waiting for the springs or for daylight to enter Gijon, with south-west winds, they will be well sheltered between this cape and cape Torres, taking care to keep $2\frac{1}{2}$ or 3 miles off shore, which at night may be done by bearings of cape Peñas or Gijon lights.

From the eastward keep at least half a mile from Santa Catalina point in passing, especially if there be any sea, to clear the Outer Serrapio; taking care, with the wind from the eastward, not to run too far to leeward before receiving a pilot. The hawser and lashings should be ready on deck before entering the basin, and if the weather

be bad, and much sea on, preparation should be made for all sail to be taken off smartly as the vessel enters, or serious injury may be done by collision with other vessels.

Fishermen and coasters, when the sea is too heavy to cross the bar, take the Carrero channel, between the Inner Serrapio and the Vendavel shoals. There is more water in it than on the bar, but when the sea is high it is very narrow, having scarcely room for a large boat.

Beacons.—The two conical beacons, easily seen on the shore abreast, near the chapel of San Stephen, kept in line lead through the Carrero channel.*

CAPE TORRES.—The name of this cape appears to be derived from the land terminating on its sea face in steep, rugged rocky pinnacles, formed in the shape of towers. A craggy islet, named Orrio, is detached from its north-west point, leaving a passage inside it for boats. The only dangers to be avoided in entering Gijon bay are a reef, which only breaks in a heavy sea, extending N.E. a short distance from the cape, and a rocky bank, named the Figar, which forms the northern termination of the rocky bottom in the bay. This bank has 8 fathoms over it, and breaks when there is a heavy sea, at which time all the other dangers show themselves by the breakers; it will, however, be avoided by anchoring before Olivo point comes on with cape San Lorenzo.

River Abaña.—The coast from cape Torres trends to the south-west, and continues high, steep, and of a reddish appearance, to the eastern termination of an elevated sandy plain of some extent named the Abaña, which commences at the mouth of the river of that name, and from its whiteness is visible some distance off. The Abaña enters the sea by a steep beach about three-quarters of a mile from the cape, and in fine weather is frequented by boats at high water. From thence the coast trends in a north-west direction, and continues steep, with rocky points and small patches of beach, for about $2\frac{1}{2}$ miles to Peran point, a low, rugged projection, with a little river on its west side.

CANDAS BAY.—San Antonio point, one mile north-west of

* The Spanish Government has given Notice, dated 17th November 1888, that it being intended to construct a dock at Gijon, on the shore near the two conical beacons which served as a leading mark for Carrero channel, these beacons have been removed; also, that in lieu thereof, two marks, constructed of wood and painted white, have been erected about 33 yards further seaward, which will serve as a leading mark for Carrero channel until replaced by others, which may be easier distinguished from the offing.

Peran point, is high, steep, and of a triangular form, with a hermitage on its summit. Between these points is the bay of Candás, capable of receiving small vessels; but in a heavy sea the whole neighbourhood is in a most disturbed state.

In the western part of this bay, between San Antonio point and San Sebastian point, which is higher, of the same rugged nature and colour, and lying 2 cables southward, there is a rocky height, which recedes to the west, and on which stands the town of Candás. A small semicircular sandy beach, surrounded by two curved moles, each about 120 yards long, with an opening 65 feet wide, facing the south-east, forms the little port of Candás, which shelters 30 or 40 fishing boats at high water. It dries at low tide, and in bad weather the approach is difficult, being beset by rocks known only to the fishermen. A white buoy is moored in about 23 feet water at La Espera for the use of the fishing boats; but as the moorings are excellent, it may be used by larger vessels.

A short distance north of San Antonio point is Cuerno de Candás point, and between is a small bight with reddish cliffs, which is full of rocks. This latter point is high, steep, and projecting to the north-east, and on its outer part is a battery and guard house in ruins. Between it and Cabrito point, the next projection to the north-west, is a bay with a beach, called San Pedro, in which fishermen find shelter from westerly winds. Cabrito point is low, with a small islet off it, and fringed with rocks, the most dangerous of which is the Cabrito, covered at high water, with a passage inside it for boats.

Dangers.—The Covanin, a rocky head of small extent, with 6 feet over it, and 6 to 10 fathoms round it, lies E. by N. a short half mile from San Antonio point. Another, called Sierra de Santa Olalla, larger than the former, and lying $1\frac{1}{2}$ miles E.S.E. of the point, has $2\frac{1}{4}$ fathoms water over it, the lead falling at once into 8 and 9 fathoms, which depth continues to the shore; the sea breaks heavily on it. The Castañar, with $2\frac{1}{4}$ fathoms over it, the most dangerous of all, on account of its distance off shore and its heavy breakers, lies 2 miles E.S.E. of the point; it is not so extensive as either of the others, but more steep-to. There is another of small extent, with $1\frac{3}{4}$ fathoms over it, named the Sierra, lying S.E. $\frac{1}{2}$ S. about one mile from the point; and farther eastward a rock, named Peton de Entrellusa, which only breaks in heavy seas. The bottom is sandy between all these dangers.

Life-boat.—There is a launch for rendering assistance at Candás.

PORT LUANCO.—Baca point, about $1\frac{1}{2}$ miles northward of Cabrito point, is a high promontory, projecting to the north-east, with cliffs of rugged rocks. Half a cable northward of Baca point is the Chato rock, which is steep to, and covered at high water, and between it and the shore there is a passage for boats. Between these points the coast forms a bay, at the head of which is the town and port of Luanco. The so-called port is formed by a little mole which curves to the south-west, but the space enclosed by it is so limited, that it will only berth a few small vessels. It dries at low water, but vessels are not injured by grounding, the bottom being soft mud. A north-west sea sends a swell in at high water. Excellent water is obtained from a fountain north of the church. Supplies of all kinds are plentiful.*

The principal exports are grain, timber, and salt provisions.

Directions.—To enter the port, a vessel will have to pass between the shoal of Juan de Melao, with $2\frac{3}{4}$ fathoms water over it, on the north, and the rocks of Espiga, &c., on the south. Steer in with the north side of the palace, a conspicuous building, in line with the mole head, bearing about W. $\frac{1}{2}$ N., and anchor in about $2\frac{1}{2}$ fathoms water, sand, and, if necessary, wait for the tide to enter the harbour.

Tides.—It is high water, full and change, at port Luanco at 3h.; springs rise $12\frac{3}{4}$ feet, neaps $6\frac{1}{2}$ feet, varying according to the direction of the wind.

Bañagues bay.—The coast westward of Baca point is high and precipitous as far as Aguillon point, which is smooth and projects to the eastward, and at a short distance from it is Aguillon rock. Between these points there is an intermediate point, which, with Baca point, forms Moniello bay, over half a mile across, and at its head is a rivulet of the same name. Half a mile north-west of Aguillon point is Sabugo point, and between, the coast recedes one mile to the southward, and forms Bañagues bay, bounded by sand, through which the little river Bañagues runs into the sea. The whole bay is scattered with rocks, and is only used by a few fishing boats.

Sabugo point, 2 miles S.E. $\frac{1}{2}$ S. from cape Peñas, is low and rugged, with a reef extending off it, terminating in the Cordero rock, which is always above water, and boats may pass between it and the shore in fine weather. From thence the coast is rugged and fringed with rocks to Narvata point, the south-east extreme of Llumeres point.

Llumeres bay.—The coast on the east side of cape Peñas trends to the south-east, continuing in steep cliffs and forming a bight, terminated by a high round islet, named Castro, which is separated

* See Admiralty plan :—Port Luanco, on Sheet of plans, No. 726.

from the land by a channel full of rocks. To the east of the islet is a spacious bay, named Llumeres, with a clean beach of coarse dark sand, terminated to the south-east by Narvata point, steep, and of moderate height, from the foot of which projects a rocky reef; the ruin of a castle stands over the point. The southern shore of the bay is high, steep, and bold, but the northern shore is beset with rocks.

Llumeres bay is sheltered by cape Peñas from the heavy north-west seas; it is also a good place of refuge against south-west winds, and in case of necessity, lives may be saved by running the boats into the smooth water between the Castro rock and the beach. Coasting vessels frequent the bay for the iron ore which falls from the cliffs, and anchor near the shore in 8 to 10 fathoms, sand; being, however, open to the north-east, it should be left the moment the wind threatens to blow from seaward.

CHAPTER V.

COAST OF SPAIN.—CAPE PEÑAS TO THE RIVER MIÑO.

 VARIATION in 1891.

Cape Peñas - 18° 20' W. | Cape Ortegal - 19° 10' W.
 River Miño - - 19° 10' W.

CAPE PEÑAS is the name given to the easternmost point of a headland which projects to the northward from the general line of coast, and is named by the natives Pedregal, from the numerous rocks by which it is surrounded. Its northern face is about a mile in extent, east and west, and 340 feet above the sea level, and presents three rugged precipitous points. At the west extreme of this headland is a pinnacle rock, named Agudo de Sabin or Peñas, which may be visited on foot from the mainland; it has on its north-west side a large deep cave, which from a distance has the appearance of a chapel, and the fishermen name it the Capilla or Canalon del Sabin. The islet of Gavierra lies off the east extreme of the cape, with a channel between for boats. A short distance from the edge of the cliff, stands the light tower, with the keeper's dwelling on its northern side.*

Caution.—The attention of Mariners is called to the recent publication of Admiralty Charts, No. 1,053, cape Peñas to Pontevedra bay, and No. 1,755, San Ciprian bay to cape Finisterre, comprising the north-west coast of Spain :—

These charts contain the offshore soundings obtained by H.M. Surveying Ship *Sylvia* in 1886, which now furnish a safe guide for the navigator in approaching this dangerous coast in thick weather, especially from the northward.

Under such circumstances soundings should be obtained in due time.

* See Admiralty charts :—Cape Peñas to Pontevedra bay, No. 1,053; scale, $m = 0.2$ inches; San Ciprian bay to cape Finisterre No. 1,755, scale, $m = 0.3$ inches; and Bay of Biscay, No. 1,104; scale, $m = 0.07$ of an inch.

LIGHT.—The round tower on cape Peñas exhibits, at an elevation of 340 feet above high water, a *revolving* light, which shows alternately *white* and *red*, eclipsed every *half-minute*, and visible in clear weather from a distance of 21 miles.

The following are the principal dangers by which the headland is surrounded :—

Somos Llungo bank, lying E. by N. $\frac{1}{2}$ N. from the light-tower on cape Peñas, and 3 miles from Gaviera islet, has 13 to 16 fathoms water over it, the lead falling immediately into 30, 40, and 45 fathoms, in a direction principally N.E., towards which the bank seems to be nearly vertical. Towards the land the bottom is more inclined, there being 30 fathoms near the bank, 23 fathoms about mid-channel, and 16 fathoms near the Merendálvarez. In bad weather the sea breaks heavily on the bank. From the shoalest part of the bank the Agudo del Sabin is in line with Deva isle, and the western peak of monte Ventoso or Peral, is in line with the field of Narvata. Peral peak, about 5 miles south-west of Avilés, will be known by its three peaks, the highest being to the west, and the lowest and most pointed to the east. The field at Narvata terminates at the sea in a cliff on the south shore of Llumeres bay, and is known by the ruins of a castle.

Merendálvarez reefs.—Several sharp rocky heads extend in about a N.E. by E. direction from cape Peñas ; and a chain of reefs, named the Merendálvarez, with little water over them at high tide, extend northward from Gaviera islet in line with the cape, and terminate in a rocky head, the Romanella, which dries at low water, and from which the middle of Erbosa isle bears W. by N. Between this head and the Merendálvarez there is a narrow channel occasionally used by coasters, and there are channels between the reefs for boats. The Romanella is dangerous at night when the sea is smooth.

Erbosa isle, lying off the western part of this headland, $1\frac{1}{2}$ cables N by E. $\frac{1}{2}$ E. from the Agudo del Sabin, is of moderate height, steep to the north-east, and slanting down rapidly to the south-west, on which side there is a natural arch, through which boats pass in moderate weather. The channel between the islet and the Agudo del Sabin, is 7 fathoms deep, but full of rocks, through which coasters thread their way ; but it can only be taken by those locally acquainted, and only in moderate weather, for however little the sea, the whole passage abounds with breakers, and the currents are strong.

A rugged islet of conical form, named the Bravo, lies N.E. $\frac{1}{2}$ E. half a cable from the Erbosa ; and another, the Monista, a short distance to the northward of it ; to the west there are numerous minor rocks,

five of which, named Corberas, are always above water. There are also three sunken rocks, named the Conos, the most dangerous of which is Noroeste (north-wester, from its lying in that direction) lying half a mile from Bravo, which has less than 4 fathoms water over it, but its position is pointed out in fine weather by the ripple over it, and in bad weather by the breakers. Between the Noroeste and Bravo there are 20 fathoms water.

Directions.—Cape Peñas, being one of the most salient points of this coast, is easily made from either direction, either by its light at night or appearance by day. Besides projecting considerably to the northward, the surface of this promontory is level to the foot of the high land which continues along the whole coast of Astúrias 3 or 4 miles from the shore. In formation it is like capes Busto and Bidio (page 244) and of the same colour, for its cliffs present the same whitish hue of quartz, of which it is partly composed; seen from the east or west it presents the same level down to the cliffs, and only differs from them in having some few groves of trees and houses on its surface.

Vessels from the westward may in fine weather, or with south-west winds, run between the Somos Llungo and the cape, and may borrow towards the Romanella, passing one mile outside the Gaviara and Bravo, in 30 to 40 fathoms water; but in bad weather the cape should be given a berth of 5 or 6 miles, not only to avoid the breakers on the Somos Llungo, but also the heavy sea over the uneven bottom, which extends a considerable distance off the land. The 100 fathoms line of soundings passes about 10 miles northward of Cape Peñas. To clear the Conos when coming from the westward, the Baca de Luanco should be kept open of the Merendálvarez rocks; and from the eastward keep well northward until Erbosa is open of Gaviara, then continue westward.

WINDS and CURRENT.—Contrary winds frequently occur in the vicinity of cape Peñas. A vessel will sometimes make the cape with a strong north-east or east wind, and find the contrary in with the land; the same thing occurring with west or south-west winds. In summer the prevailing winds are easterly, with some few interruptions of westerly, accompanied with rain. In winter the winds are between the south-west and west; these bring dirty weather, blowing strong for three or more days, with rain, until in a heavy squall the wind veers to the north-west and the weather clears up. These southerly winds, when they blow hard, make great havoc among the coasters; and the heavy sea thrown in upon the coast by the north-westerners completely closes the ports.

The northers, called *Travesías*, do not last over three days, and only blow between December and March. A vessel caught in one on this part of the coast had better stand to the eastward, as the trend of the land on the east side of the cape is southward of east, and the wind generally ends at north-east.

The general direction of the current off the cape is to the eastward, particularly in the winter. In summer it sometimes runs to the westward, especially should north-east winds prevail. The flood stream sets to the south-east, the ebb to the south-west.

THE COAST from the west extreme of cape Peñas trends about a mile to the southward to Arcas or Ratin point, which is low, rugged, and foul. From thence commences an extensive beach, which terminates to the westward abreast Bermea islet. The beach is named Arenal de Berdicio, and in the bay which it forms, coasting vessels anchor for shelter from north-east winds in any convenient depth, but generally in about 14 fathoms, fine sand, a position from which they can make sail and clear the land. The whole bay is clean, and can be navigated by the lead; but be careful not to be caught in it with an on-shore wind.

Bermea islet, so named from its reddish appearance, is rugged, and lies one cable from the beach, with a clear channel of 7 fathoms water between it and the shore. To the westward of this islet, on the east side of Llampera point, is a small cove, named *Peurto del Llampera*, sheltered from the sea by a point and some rocks, and for which the fishermen of Luanco, Candás, and Avilés run for shelter in bad weather, and haul their boats up on a small shingle beach.

Llampera point is low and craggy, with an islet and some rocks off it. From thence a bold coast, which may be navigated by the lead, trends to the westward, forming a bight to cape Negro, or del Cornorio. This cape is high, precipitous, and like cape Peñas. At its foot are some rocks, which uncover at low water, and a shoal of small extent, but a vessel may pass it safely at the distance of half a mile.

Home point.—From cape Negro a steep and sinuous coast runs to the southward to a rocky projection, named Home point, between which and Forcada point, which bears about S.W. by W. 2 miles from cape Negro, is Chaon bay, bounded by an extensive beach, interspersed with rocks. Forcada point is bold, rocky, and projects to the north-west; and $1\frac{1}{2}$ cables south-east of it is Castillo point and the bar and mouth of the river Avilés.

RIVER AVILÉS.—Vessels drawing 13 feet can cross the bar of this river in favourable weather at high water springs, but it is so

obstructed by shifting sand-banks that only those of about 7 feet draught can proceed up to the town of Avilés, standing on the western bank, 3 miles within the entrance, and even then the channel should be buoyed. Vessels lie alongside the mole at the town, on a mud bottom; but in taking the ground in any other part of the river, take care that the vessel's head is placed to the stream of tide. The anchorage near San Juan, a collection of houses on the north bank, is three-quarters of a mile within the bar, where small vessels may lie afloat at low water. Above San Juan the banks dry, and near Avilés the river may be crossed dry-footed.

On the west side of the entrance begins the extensive sandy plain of Espartal, which, from its height and whiteness, is seen from a considerable distance. It terminates to the westward in a low rocky point, named Requexo, the extreme of a steep height. To the westward of this point is the beach of Arnao, on which are hauled up the boats that embark coal obtained from the adjacent mines. The town of Arnao is on a hill near the sea. On the above plain, and near the shore, is the tramway by which the manufactures of Arnao are conveyed to the mole formed opposite Emballo bay.*

The bar extends from the point on which stands the castle of Avilés, to the north extreme of the plain of Espartal, and the depths over it vary from 4 to 8 feet at low water springs, according to the weather in the offing; the deep water channel, not more than 50 yards wide, lies close to the north point.

LIGHT.—On Castillo point at the north side of entrance to the inlet of Avilés, is an octagonal light yellow coloured tower, which exhibits, at 116 feet above high water, a *fixed red* light, visible in clear weather from a distance of 10 miles.

Tides.—It is high water, full and change, on the bar of the river Avilés at 3h., and an hour later at the town of Avilés; ordinary springs rise 12 feet. The rise is about 2 feet more with south-west and north-west winds, according to their strength, and the contrary with winds from the opposite quarter. Opposite the town the ebb runs 8½ hours, the flood 4 hours. The river is not subject to freshes, and the greatest rate of the current does not exceed 4 knots.

Harbour works.—The extension of the moles along the whole space north and south of the anchorage at San Juan, and the prolongation of the south mole over the bar, are in progress, and it is

* See Admiralty plan of river Avilés, on sheet, No. 710.

proposed to construct a large dock near the mole of Mina de Arnao.

Buoy.—A red buoy, with staff and barrel painted white, is moored in 26 feet at low water to mark the works in progress, for the prolongation of the southern mole, and vessels entering the river should leave this buoy on the starboard hand, so as to avoid the shoal water.

Directions.—The pilots go out of the Avilés in favourable weather when a vessel is seen in the offing. The channel into the river lying in an easterly and westerly direction, has the advantage of being accessible with south-west and north-west winds; but when these latter blow strong and raise much sea, the bar is impracticable, and a vessel should keep out of the deep bight between cape Negro and Deba isle, or she will be in great danger, and amongst the numerous rocky banks with which the bight is encumbered. With other winds a vessel may anchor to await a tide, in 7 fathoms, sand, between Forcada point and Avilés; but it would not be prudent to pass a night here, for fear the wind should veer to the north-west.

As a general rule, a sailing vessel bound from the westward, with westerly winds, should not stand for the river except at a favourable time for crossing the bar, for, besides the strong current setting towards cape Peñas, she may have to encounter a chopping sea occasioned by the uneven rocky bottom in the bight. Steering for the entrance, keep the land aboard between Forcada point and Avilés castle, and bear in mind that the deepest water over the bar is close to the point of the castle, and that it will be necessary to approach the point almost to the rocks. After crossing the bar keep along by the northern mole, the only danger being the Arañon rock, marked by a buoy, a quarter of a mile within the entrance. La Osa rock, on the southern side of the channel and opposite Emballo bay, is marked on its northern edge by an iron beacon surmounted by a white barrel.

Avilés bay.—The deep bight between cape Negro and Deba islet is dangerous with north-west winds when they blow strong, for the sea gets up on the numerous rocky banks within it, and a vessel would be in great danger of being embayed, there being no other means of shelter than to take the bar of Avilés if the tide admit, but the bar is dangerous at this time.

The most dangerous of the banks is the Anuales reef, but, as it

breaks with the least sea on, it forms a useful mark. East of this is the Peton, a rocky head with 5 fathoms water over it, which breaks when there is much sea, and from which the chapel of Espíritu Santo (in Právia inlet) is in line with the inshore slope of Deba islet, and the storehouse of San Juan (a white house, the farthest south in the inlet of Avilés) is seen a little open of Avilés castle point; a vessel therefore approaching Avilés river from the westward should keep the storehouse in line with the point until the line of the Deba with the chapel is passed.

Another bank, with 8 to 9 fathoms water, extends some distance westward from Forcada point inclining towards the above rocks, so that all these are but the summits of a rocky bed, having unequal depths of 15 to 20 fathoms.

Rayo or Vidrias point, $3\frac{1}{4}$ miles westward of Forcada point, is high and steep, with a rock off it, named Moro, which is awash at high water. A reef named the Anuales, on which the sea breaks heavily, stretches nearly a mile in a north-east direction from the point, with channels between the rocks. On its outer end are 7 fathoms water, and 16 to 22 fathoms round it; several heads show themselves at low water.

On the east side of Rayo point the coast runs to the southward, forming a bay called Correal, at the head of which is a sandy beach. Santa Maria del Mar bay, named from the hamlet on the high land of the coast, follows this to the eastward, and off the west part of its eastern point is an islet named Ladróna. In running along the coast, the houses and chimneys of the factories of Arnao are seen, and a little to the eastward of them those of the zinc works near the shore.

Deba isle.—From Rayo or Vidrias point a high precipitous coast, with patches of sandy beach bordered with rocks, runs in a westerly direction for one mile to Cagollo point, 2 cables N.E. $\frac{1}{2}$ N. from which lies Deba islet, which is high, and surrounded with rocks. There is a navigable channel for small craft between it and the main, but a pilot is necessary, as there are several rocks. Deba islet is a good mark for Právia inlet.

Cagollo point projects to the north-west, and forms with Espíritu Santo point the bight in which are the beaches named Bayes and Quebrantes; the former beach has some scattered rocks off it, and terminates at Cagollo point. This point has also some rocks off it, but they are sufficiently bold to enable coasters to pass them at a short distance.

RIVER PRÁVIA.—This beautiful estuary, of so much importance from the large exports of timber that come down the Nalon, is accessible at high water to vessels of 15 feet draught, with the advantage of their always lying afloat abreast the village of San Estéban, which stands on the western shore of the river, three-quarters of a mile within the bar. Here vessels are secured four abreast in from 20 to 30 feet water, good holding ground, and sheltered from westerly winds by the Sierra del Espíritu Santo. The village stands on the projection of the sierra.*

Supplies.—Fresh water is obtained from a fountain at the village, not far from the ruins of the mole. Provisions are scarce, and they can only be procured in any quantity at Múros, $1\frac{1}{2}$ miles distant, where the marine superintendent of the district resides.

The bar is impassable with heavy seas, notwithstanding it is somewhat sheltered by the reefs which extend in a northerly direction from the west point of entrance. The outermost of these are two rocks called Lladrona, lying N.E. $\frac{1}{2}$ N. distant $1\frac{1}{2}$ cables from the hermitage on the point. The bar, which is of sand, frequently shifts, but always keeps over on the western side towards these rocks, and there are generally 7 feet over it at low, and 20 feet at high water springs.

Tides.—It is high water, full and change, on the bar of the river Právia at 3h.; springs rise 12 to 13 feet, neaps about 10 feet. With westerly winds the rise is 3 to 4 feet higher, there being with these winds frequently 22 feet on the bar, while with easterly winds there is sometimes less than 14 feet. The mean rate of the current over the bar is about 4 knots, increasing to 5 knots, and even more, on the ebb, at the time of the freshes.

Directions.—Vessels of large draught should take a pilot both for entering and leaving Právia inlet. If the bar can be crossed, the pilots go out directly they see a vessel approaching. The best time to enter is about 2 hours before high water. The only danger in the channel is the Lamparon rock, about the size of a large boat, lying just within the bar. It dries at low water springs, and leaves a passage 35 yards wide on its western side, and another 80 yards wide between it and the edge of the banks of the eastern shore, which is the channel generally used.

As before stated, the bar is impassable with heavy seas, and it is only with winds from S.E. round by North, to N.W., that it should be taken by a sailing vessel. With a north-west wind it must be

* See Ria de Právia, on Admiralty sheet of plans, No. 726; scale, $m = 18$ inches.

crossed on the flood, for the wind will be scant and squally as the land is neared, and on the ebb, with this wind, a vessel would run the risk of being set on the Lamparon rock. Having passed this rock, keep about 50 yards from the west shore of the river, in from 10 to 22 feet at low water, anchoring abreast the village.

PORT CUDILLERO.—About 3 miles W. by N. $\frac{3}{4}$ N. from the entrance of the Pravía, is the lighthouse on Revallera point, which forms the eastern side of the little port of Cudillero. There are several rocks lying a short distance off this part of the coast, the outermost and most dangerous of which, called the Señorío, with 4 feet over it at low water, is 3 cables northward of Furada point, with $3\frac{1}{2}$ to 4 fathoms between it and the point. To pass clear outside, keep Erbosa islet open north of Deba islet.

Port Cudillero is nothing more than an opening in the cliffs, sheltered on the west by a chain of dark islets called Colinas, which run out some distance to the northward. A mole extending east and west with a narrow entrance close to the rocks, is all that affords shelter. The port dries at low water, and is only adapted for fishing vessels, which, on the approach of bad weather, are run upon the beach. The inhabitants are nearly all employed in the fishery.

LIGHT.—The lighthouse on the east point of entrance to port Cudillero, is a rectangular building, with a white tower rising from it, the whole being 25 feet high. It exhibits, at 98 feet above high water, a *fixed white* light, visible in clear weather from a distance of 10 miles.

ARTEDO BAY, about $1\frac{1}{2}$ miles westward of Cudillero, is nearly a mile wide at entrance, and half a mile deep, and affords a good summer anchorage for all classes of vessels, in 8 to 10 fathoms, sandy bottom, sheltered from south-west and north-west winds; but in the winter months a vessel would be exposed to a north-west gale, and also to the sea that rolls in from the north-west. A large vessel will find a good berth in 10 fathoms, off a white mark in the cliffs on the west side of the bay, with the hermitage of Santa Ana bearing S. by W. $\frac{1}{2}$ W., distant $1\frac{1}{2}$ cables from the shore. There is a clean beach at the head of the bay.

Vessels bound to this bay from the westward, will recognize its position by Rabion islet, and by Monte Santa Ana, or Montares, which latter is south of the bay, and will be known by the white hermitage, which stands on its eastern slope. Rabion islet, high and rocky, lies half a mile westward of the west point of Artedo bay. It is connected to the coast by a chain of rocks, and several rocks extend from it to the E.N.E., all of which contribute to shelter Artedo bay from the

north-west. The extreme end of the rocks extending from the islet is called Rabion point, and in bad weather a berth of at least a mile should be given to it, for the sea runs high there, and half way across the mouth of the bay.

The coast westward of Rabion islet, between it and cape Bidio, forms two bays, named Oterio and San Pedro, separated by a high headland, off which are rocks and detached dangers. San Pedro, the western bay, is the larger, and has a clean beach. Cape Bidio or Vidio is of moderate height, and much the same in character as cape Busto, which is nearly 10 miles to the westward. About 40 yards off the cape, is a high conical islet named Chouzano or Lozano, with a passage between for boats. The islet, and also the cape, is composed of white stratified rocks; a cable outside the islet is a sunken rock called Chouzanin.

The coast between the above capes may be passed at a mile distance in fine weather without risk, in 20 to 30 fathoms, rocky bottom. The cliffs are 230 to 280 feet high, the land rising 2 or 3 miles in the interior to the mountain range. There are breaks in the cliff more or less deep, with small beaches, which boats can only approach under favourable circumstances.

A few rocks lie off the coast; the most remarkable and farthest from the shore are the Negros, so called from their dark appearance. They are low, have a passage for fishing boats between them and the shore, and are the most prominent of an extensive reef $1\frac{1}{2}$ miles S.W. of cape Bidio.

Cape Busto, having a village on it, is rather higher than cape Bidio, and will be known by its level appearance, also by the cliffs in which it terminates, and by the lighthouse, which is an angular white building, with a tower rising from it. A reef, on which the sea generally breaks, extends north-west from the cape; it is always covered, with the exception of a rock, called La Moura, which lies one cable from the cape, and dries at low water. An islet of moderate height and conical form, called Serron, lies East from the cape, and is connected with it by a reef which shows at low water; there are detached rocks off the islet and the cape, but being bold they may be passed at a short distance.

A rocky bank, named the Serron, with from 23 to 27 fathoms water over it, deepening to 55 fathoms on the north side, and 45 fathoms on the south, lies E.N.E. from cape Busto, and 4 to 5 miles off the coast. It is only dangerous in bad weather, when the heavy seas have been seen to break.

Another rocky bank of small extent, with 27 to 30 fathoms water over it, lies north of cape Busto, distant $2\frac{1}{2}$ miles; there is a heavy sea over it in bad weather.

From cape Busto the coast is high, steep, and reddish, and trends to the southward to the river Esba, called also Caneiro, the bar of which dries at low water. Inside the bar is the little port of Cueva, which is annually visited by coasters to embark timber.

The bar has a rock in the middle of it, and can only be crossed at high water under favourable circumstances. From thence the coast takes a westerly direction to the entrance of Luarca, and has some off-lying rocks.

LIGHT.—The lighthouse on cape Busto exhibits, at an elevation of 307 feet above high water, a *fixed white* light, varied every *two minutes* by a *red flash*, and visible in clear weather from a distance of 12 miles.

PORT LUARCA, formed at the head of a small bay of the same name, $3\frac{1}{2}$ miles westward of cape Busto, is only frequented during the summer months by small craft that can take the ground. The bay has anchorage in 5 to 6 fathoms, sand, but the clean ground is very limited, and vessels should only remain in it during fine weather, or to wait for tide to enter the port.*

The port is very small, in fact it is nearly blocked by a bed of shingle, leaving only a narrow winding channel, the outlet of the river Negro which dries at low water, and follows the walls of a circular mole or wharf on the eastern side of the port. The town is built in the form of an amphitheatre, the principal part being on the eastern side of the port. Water and provisions are plentiful, and the assistance of shipwrights might be obtained.

Depth of water.—The bar nearly dries, and vessels drawing 12 feet require spring tides and a smooth sea to cross it, but a pilot is indispensable.

LIGHT.—On la Blanca point, and a little north of the chapel, is a square tower which exhibits, at an elevation of 197 feet above high water, a *fixed white* light, visible from a distance of 7 miles.

Tides.—It is high water, full and change, at Luarca, at 3h.; the rise is 12 feet at ordinary springs, and 14 to 15 feet when it blows fresh from N.W. to S.W.

Directions.—The position of Luarca will be easily recognized by the lighthouses on cape Busto and la Blanca point, and by the chapel

* See Plan of Luarca, on Admiralty sheet of plans, No. 726; scale *m* = 18 inches.

on the latter. Blanca point is the extreme of a small peninsula forming the eastern side of the bay, and the chapel, which has a high belfry, is conspicuous from a good distance. This point has some rocks off it, the outer one of which, called the Moura, is one cable north of the point, and nearly awash at low water. A vessel should pass outside the rock, for between it and the point is another rock, with 11 feet of water over it.

Mugeres point, the west extreme of the bay, is low and rocky, and may be passed at the distance of from 1 to 2 cables in fine weather, but much farther off in bad weather, for the foul ground off it produces much sea; and when it breaks on the rocks off this point, it also breaks on the bar.

The coast takes a N.W. by W. $\frac{1}{2}$ W. direction from Luarca for 3 miles to Cuerno de Barayo point, a rocky projection with reddish coloured crags, one of which forms a curve to the south in the form of a horn. The point is clear of danger, and westward of it is a large opening in the rocks by which the river Barayo discharges itself into the sea, but fishing boats can scarcely cross the bar at its entrance at high water. Romanellas point, one mile to the westward, has off it, in a north direction, two dark islets, with a passage between them for boats, and nearer the coast there is a larger islet; they are called the Romanellas, and may be passed pretty close, as they are free from rocks.

One mile westward of the Romanellas is the Atalaya* de Vega, with a small chapel on it. This chapel may be known from the hermitage on cape San Augustin, from which the chapel bears N.W. by W. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles, and also by its being larger and standing east and west, while the hermitage is north and south. It is on the level land, about 90 feet above the sea, and the point which terminates the Atalaya is called Barroco. A short distance eastward of the chapel is the entrance of a tortuous channel between reefs, which dry at low tide, leading into port Vega. This port dries at low tide, and is very confined, but it is without a bar, and will admit vessels drawing from 8 to 9 feet at high water. Coasters run into it when they cannot get into Návia.

Three-quarters of a mile westward of the Atalaya de Vega is Vega island, and a short distance N.E. of it is a rock which dries at low water. The island lies north and south, forming a high round head, and reefs extend a short distance from it in all directions. On its western side near the coast is a dark rocky islet, named Corberon.

* Atalaya signifies any elevation from which a considerable view may be obtained.

The coast on the west side of the island is composed of cliffs, broken at short intervals, as far as an extensive sandy beach of a darkish colour, called Freijulfe; the beach is steep and scattered with rocks. Corbera point, about a mile westward of Vega island, is low and rocky, and a short distance outside it is a rock always above water. Between this latter point, and Campel point at the east side of entrance to the Návia inlet, is a low projection of the coast called Hocico de fuera, dangerous from a sunken rock with less than 2 fathoms water over it, lying one cable outside it, which breaks with the least sea.

RIVER NÁVIA.—The mouth of this estuary is half a mile S.E. of cape Agustin, and being nearly midway between the lighthouse on cape Busto and that on Tapia isle, they will readily indicate its position. Cape San Augustin, 111 feet high, has a chapel on it. Monte Jarrio, 1,056 feet high, bearing S.W. by W. about 2 miles from the cape, is also a good mark for the river.

The Návia is of considerable importance from the abundance of oak timber which comes down it, and from its rich salmon fishery. The entrance is about a third of a mile in breadth, but the channel is narrowed within by marshy ground, and abreast the town it is only half a cable across. It will admit vessels of 9 to 11 feet draught at high water springs, but as its bar, which has a rock lying nearly in mid-channel, is constantly shifting, and always breaks, however little sea there may be on, no vessel should attempt to cross it without a pilot. Having passed the bar, the vessel will be well sheltered, and can lie afloat in 11 to 17 feet at low water.

The village of Návia stands on the eastern bank, nearly a mile within the bar. There are no pilots residing in the river; this duty is performed by the fishermen of the town of Ortiguera, which stands along the craggy declivities surrounding a small cove on the west side of cape San Augustin.

The coast between cape Augustin and cape Blanco, which is $5\frac{1}{2}$ miles westward, is composed of steep cliffs fringed with numerous rocks, and forms several openings and bays. Engaramada point, $1\frac{3}{4}$ miles from cape San Augustin has some islets off it, named Gavieros (Gabeiro de fuera), and N. by W. $\frac{1}{2}$ W. over a cable from the outer island is an extensive reef lying N.W. and S.E., a great part of which dries at low water. It always breaks, and, when there is much sea on, the breakers extend out a considerable distance. Between the reef and islets there is a channel of 9 to 11 fathoms water, which coasters use in fine weather.

Acebro's point, the next projection to the westward, has a reef off it which dries at low water. This point forms the east point of entrance to Torbas bay, which is open to the northward and surrounded by cliffs, but it has a small beach, and coasters find shelter in it during the summer. Off Viaveles, about a mile from the shore, there are 11 to 14 fathoms, rocky ground, which breaks in a heavy sea. Beyond this there are banks with more or less water, one of which, called the Cabezo, lying $2\frac{1}{2}$ miles from the coast and N.E. from the entrance of Viaveles, has 23 fathoms over it. The sea runs high upon this bank, and it would be dangerous to pass over it in bad weather.

Cape Blanco (so named from its white appearance), to the westward, is about 130 feet above the sea, and terminates in a projecting rugged point; some rocks lie a short distance off its western side.

About a mile eastward of Viaveles, is the church and village of Caridad at the termination of a group of poplar trees, and is a good mark for Viaveles; the coast varies from about 90 to 140 feet in height.

Port Viaveles, on the east side and half a mile southward of Cape Blanco, hardly deserves the name of a port, but many vessels have been constructed here of late years, one of which was 640 tons burden, and she was got out with much difficulty. The entrance, lying N.W. and S.E., is scarcely 40 yards in breadth at low water. About a cable within is a pool about half a cable across, and in its north-west angle there is an opening, with an entrance 18 yards wide, running in one cable to the south-west. So much of this, as well as part of the pool, is dry at low water, that even vessels of the lightest draught cannot lie afloat at low water. Coasters frequent it, and are well sheltered in all weathers.

The mouth of this port is closed in heavy seas, for breakers extend a considerable distance outside it. Water is easily procured from the spring that supplies the town. Provisions are scarce.

Tides.—It is high water, full and change, at port Viaveles, at 3h.; and the rise at springs is 13 feet.

PORCIA BAY.—The coast from Cape Blanco, westward to Porcia bay, is rocky, steep, and of a whitish aspect. At the head of this deep bay the river Porcia runs through the sand. Coasters visit this river to load wood and grain, but they must take advantage of the tide, as the channel nearly dries at low water. The bay is bounded on the west by Forcada point and islet, and on the east by a high whitish headland, called the Atalaya de Porcia and also the Olga

Mourina. Outside it there is an islet named Corbero. To enter the river it will be necessary to pass near two large islets, which must be left on the port band in taking the bar.

CAPE SAN SEBASTIAN, on which stands the chapel of that saint and the village of Tapia, is a small promontory $2\frac{1}{2}$ miles westward of Forcada point, having two islets off it named Tapia and Orrio de Tapia. The former, lying half a cable northward of the cape, and connected to it by a reef which dries at low water, is 165 yards long, 100 yards wide, and 60 feet high, having on its summit an octagonal granite light-tower.

Orrio de Tapia, lying northward and within a cable of Tapia islet, and connected to it by reefs which nearly dry at low water, is round, conical, and much lower than the latter islet.

Reefs extend a great distance from Orrio in a N.E. direction ; they dry at low water, with the exception of two isolated rocks called Porcegosas, which from a distance resemble boats. The water deepens outside the reefs, and a vessel may pass a mile northward of them without risk.

From cape San Sebastian a bold coast trends westward $3\frac{1}{2}$ miles to Rumeles point. Santa Gadia point, about 2 miles westward of the cape, has the two Pantorgas islets off it, and a short distance outside them are two rocks, which dry at low tide. The next point to the westward is named Rubia, steep and of moderate height, off which are some islets ; and between one and 2 miles in a north direction from it is the Castro bank, with from 11 to 13 fathoms over it, and 25 to 30 fathoms on all sides. The water breaks on this bank only in heavy seas, which is a sign that the bar of Rivadeo is not passable. Rumeles point, the next westward, is low and rocky, and 3 cables W. by S. of it is Cruz point.

An extensive reef, which extends 2 cables from the shore, encircles these two latter points. Cruz point descends in declivities from a tongue of land which forms the eastern side of entrance to Rivadeo, and terminates at the sea in cliffs of steep rock.

LIGHT.—The octagonal granite light-tower on Tapia islet, cape San Sebastian, exhibits, at an elevation of 77 feet above high water, a *fixed white* light varied by a *flash* every *two minutes*, and visible from a distance of 14 miles.

GULF of FOZ.—The coast from Tapia islet trends about W. by N. $13\frac{1}{2}$ miles to the entrance of Foz, then in a N.W. direction for 24 miles

to Estaca point, the north extreme of Spain. It is much indented and high, the ridges of the lofty mountains in the interior reaching the shore, especially between cape Morás and Barquero; from thence eastward the mountain slopes become less abrupt, leaving between them and the sea high level ground, terminating in points at the shore. Storm-beaten as this coast is by northerly gales, its navigation would be dangerous were it not for the inlets of Rivadeo, Vivero, and Barquero, which afford refuge from those winds, the two latter being free from bars and easily taken. There is also the little port of San Ciprian and other places of shelter for small craft.

The large indentation of the coast between Tapia islet and Burela point is called the gulf of Foz or Masma, after the river of this name, which falls into Foz inlet. Its shores are foul, and the soundings irregular, over generally rocky bottom, which raises a high sea with on-shore gales, when a vessel should give it a wide berth, not only for fear of being embayed, but to avoid the breakers, which in some places are then 4 miles from the land. The prevailing south-west gales of winter blow in tremendous squalls in the gulf, their strength sometimes extending 12 to 15 miles off shore, but outside this distance a manageable and regular wind prevails.

RIVADEO INLET,* the entrance to which is about half a mile wide, between Cruz point and Pancha islet, was at one time an excellent port from the facility of taking it, but is now so obstructed by sands that there is difficulty in entering with scant winds.

Carabela bank.—A bank called the Carabela, which extends in a northerly direction from Pasada point on the east side of the inlet towards the Carrayas rocks half a mile within the entrance, is daily increasing, and threatens to close the entrance of the channel leading to the port, by joining itself to the above rocks; it has from 2 to 13 feet over it at low water, and at present the channel for large vessels between it and the rocks is not more than one cable wide.

Pancha islet, which has a light-tower on its summit, is separated from the west point of entrance by a narrow channel 55 yards wide, which dries at low water. The islet is nearly one cable in length; it is steep on all sides, with a level surface 54 feet above the sea, and a reef extends from it to the N.W. About $1\frac{1}{4}$ cables N.E. $\frac{1}{4}$ N. from

* See Port Rivadeo, on Admiralty sheet of plans, No. 78; scale, $m = 3.6$ inches.

the lighthouse is a dangerous rock called Panchorro, about the size of a boat, having only 13 feet over it at low water springs, and nearly always breaks.

Carrayas rocks.—Three and a half cables S.S.E. $\frac{1}{4}$ E. from Pancha islet is the north part of the Carrayas rocks, which extend from Castrelius point in a northerly direction, and are nearly all dry at low water. Nearly 2 cables south of the point stands the castle of San Damain on a high steep point, and a little south of it, and less than 60 yards from the shore, is the Carballo rock, which dries at low water.

There is another rock, named Viga, a little farther northward, but not more than 20 yards off shore.

Rivadeo.—A short distance south of the castle is the town and port of Rivadeo. The chief exports of Rivadeo are eggs and hams; and the imports various kinds of goods and merchandise for consumption in the country.

From 700 to 800 vessels of all sizes enter the port annually, the aggregate tonnage being about 150,000 tons. There is inland communication by coach or diligence to all places, and there is telegraphic communication with all parts of the world, but the nearest railway is at Baamonde, a distance of about 60 miles. There is communication by steamers to all important ports of the peninsula.

There are no docks, but every facility for the repair of wooden vessels, and many vessels have been built in the port, but iron vessels and machinery cannot be repaired. Population of the town in 1887 was about 6,000.

Vessels are careened and built in a little bay 4 cables southward of the town, but the greater part of the building and careening takes place in the interior of the spacious but shallow bay of Figueras, in the eastern part of the inlet.

The river Eo runs into the inlet, and separates the province of Oviedo from that of Lugo.

Depth of water.—The soundings in Rivadeo inlet decrease gradually from 10 fathoms between the entrance points, to 5 fathoms abreast the Carrayas rocks, after passing which the deepest water is on the west shore. In moderate weather vessels anchor to wait tide for entering, or when they are ready for sea, in Arnao bay, on the eastern

side of entrance, between Cruz and Pasada points; it is $3\frac{1}{2}$ cables deep, and has 5 and 6 fathoms over a clean bottom of sand.

Pilots.—The village of Figueras, standing nearly opposite Rivadeo, is the residence of the best informed pilots, who look out from a tower 172 feet above the sea on Boy point on the east side of the inlet, and come off to vessels when the colours are hoisted.

Supplies.—Abundance of provisions can be procured at Rivadeo, at reasonable rates. The best and most plentiful supply of water is at Castropol, a village on the eastern shore, about half a mile south of Rivadeo. It is obtained from a covered fountain, which will load a boat in a very short time, but the watering place can only be reached at high water.

Coal can always be obtained for steamers entering the port, and there are between 100 and 200 tons usually kept in store, the average price being 18 shillings per ton. Coaling is performed by means of lighters, which carry about 10 or 12 tons each; there are no other facilities for coaling at present.

Harbour works.—A stone wharf or pier, 1,300 feet long, is in course of construction.*

Life-saving apparatus.—There is a rocket apparatus at Rivadeo.

LIGHT.—The white coloured light-tower on Pancha islet exhibits, at an elevation of 79 feet above high water, a *fixed red* light, visible in clear weather from a distance of 9 miles.

Tides.—It is high water, full and change, in Rivadeo inlet at 3h.; and the ordinary rise of springs is 15 feet, which is increased by 2 or 3 feet with westerly, and diminished as much by easterly winds. The mean rate of the stream is about 3 knots.

Directions.—The channel into Rivadeo, lying nearly north and south, and being narrow, a sailing vessel has great difficulty in taking it with southerly winds, and at all times the services of a pilot are indispensable to a stranger. The pilot service is well organized, and they go out of the inlet whenever they are required, it being only necessary for a vessel to show her colours. Monte Mondigo, 1,890 feet high, from its conical form, its solitary appearance, and the jagged rocks which crown its summit, is an excellent mark for

* The harbour works in progress are marked by two buoys.

vessels bound to Rivadeo from the northward, for directly it is seen it will be sufficient to steer for its eastern slope, which terminates in the inlet.

It frequently happens that a vessel coming towards the port with a north-west wind will find a southerly wind at the entrance. If there is any sea at the time, and the wind blows strong out, which is generally the case in winter, care should be taken to avoid missing stays in the vicinity of the Carabela bank, as there is no room to anchor, and the flood tide sets directly on to the bank, which nearly always breaks when there is any sea. With gales from north or north-west, which are sometimes so heavy as to close the port, a heavy sea sets upon the coast, and nearly the whole space between the entrance points is covered with breakers. The entrance is easy with north-east winds, as they do not send in so much sea.

If from the westward, the Farallones de San Ciprian should be made, and from thence, if autumn, or winter, and the wind inclines to the south-west, it will be prudent to run along the coast at 3 or 4 miles distance, for in this season a south-west wind outside draws to the southward in proportion as the vessel advances across the gulf of Foz, which is 19 miles in breadth between Tapia islet and Burela point, and 5 miles deep. When abreast San Miguel point, near the coast to 2 miles if the water be smooth, or 3 miles should there be any sea, until clear of the Longas off Piñeira point, when endeavour to make out the chapel of Santa Cruz, a white quadrangular building on the eastern slope of monte Mondigo, about W.S.W. from the mouth of the inlet.

Keep this chapel in sight above the cliffs until abreast Pancha islet, when steer into the inlet towards the middle of Arnao bay, until Cabanela point, the most projecting point south of the town of Rivadeo, is on with the middle of the fork or saddle formed by two elevations of a mountain in the interior, called Cotos de Balboa, bearing S.S.W. $\frac{3}{4}$ W., which is the leading mark through the narrow channel to the anchorage, a short distance inside the castle of San Damian, if the vessel draws 15 to 17 feet, or farther in according to her draught. If the tide is high, the western shore may be kept aboard as soon as the Carrayas rocks are passed, giving them a berth of 60 yards to clear outlying rocks. Vessels moor head and stern, with their heads to the southward, to guard against the south wind, which blows with great violence.

The lighthouse on Tapia islet is a good landfall to make when bound to Rivadeo with north-east winds. From thence steer towards

the entrance, keeping 2 miles off the coast if there is any sea, to avoid the breakers off it. The foul ground off Rumeles and Cruz points must also be guarded against.

The coast from Pancha islet takes a westerly direction 9 miles to Prado point, the eastern extreme of the inlet of Foz. Nearly 2 miles westward of the islet is Piñeira point, surrounded by sunken rocks called the Longas, and the ground outside of them is foul, requiring in heavy seas a berth of 3 miles. From thence to Foz the most projecting points are those called Corbera and Promontorio, both terminating in sunken reefs, which extend a considerable distance from them. Between the points, the shore forms slight bends with small beaches, nearly all scattered with rocks; between points Corbera and Promontorio, and close to the shore, are two high islets, called Portelas, from which a short reef projects.

Escairo or Calros point, the north-west extreme of Foz inlet, is low and even, forming a plain three-quarters of a mile across, extending to the west, and terminating at the foot of a small hill 220 feet high, called Coto de Castro, the pine trees on which are an excellent mark for the inlet. A rock, named Escairo, 46 feet high, with a steep black face to the north, lies off the point, and there are two islets of equal height a short distance N.N.W. of the point.

Foz inlet.—To the southward of Escairo point is an opening $4\frac{1}{2}$ cables wide, leading into the inlet of Foz, which is spacious but choked up with sand, which is nearly all dry at low water, excepting some channels and small holes with one and 2 fathoms of water in them. A few coasters visit the inlet during the summer months for corn and wood, but as the bar at its mouth is shifting and shallow, vessels of over 10 feet draught cannot enter at high-water springs, which rise about 11 feet; high water, full and change, taking place at 3h. The village of Foz stands on the western shore. The river Masma falls into the interior of the inlet.

The coast from Escairo point trends N.N.W. $7\frac{1}{2}$ miles to Burela point, forming several projections, between which are sandy beaches. The shore from Escairo point to Villarmea point is low, sandy, and scattered with rocks. Marzan point which lies between them is also surrounded by rocks. Villarmea point and Fasouro point, which is about a mile to the north-west, are low and rocky, and between them the river Oro or Fasouro falls into the sea by the houses of the village of that name; the bar at its mouth is practicable at high water for vessels of light draught.

Nois point presents a steep, bold, black front to the north-east, and fishing vessels take shelter in the elbow on its south side during south-west winds; the village of Nois is scattered on the plain from which the point projects.

A rocky coast follows Nois point for a mile as far as Preveso point, which, although like the former, does not project so far to the north-east; between them, close to the shore, is a rocky islet, called Orjal. Serrido point, which is foul, lies about half-a-mile from Preveso point.

Burela point projects to the north-east, and is the termination of a high mountain named Ronadoira, which has rather a flat summit. The point, which is low, rocky, steep, and of a reddish colour, may be passed at the distance of a mile when the sea is smooth, but it must be given a wide berth in bad weather, for there is then a heavy sea on the irregular rocky bottom which extends from it.

Less than a cable north of the point are the Chacineiras, appearing as three islets at high water, but as one at low water, and surrounded by reefs. Another, named Piedra de Burela, lies S.S.E. $\frac{1}{2}$ E. about 3 cables from the point, to which it is connected by sunken reefs; at high water the islet looks like a boat, and a short distance outside it are 7 and 8 fathoms water, sand and rock. Three-quarters of a mile S.E. by E. from Burela point is a small islet, surrounded by rocks, lying half a mile from the nearest shore. The bay, which follows the point to the south-east, is named port Burela, from the village of that name, which is scattered about it; coasters visit the port in the summer.

From Burela point the coast takes a north-west direction for nearly 4 miles to a small peninsula, on the north end of which is an Atalaya or look-out, and on the west side the little port of San Ciprian; on the east side is a little bay called Caosa, off which are some rocks, the outer and most dangerous of which, called Leixon del Nordeste, nearly always breaks. It lies S.E. $\frac{1}{2}$ E. half a mile from the Atalaya, and will be avoided by not passing south of the parallel of the north extreme of the peninsula.

Between the Atalaya and Burela point, and about $1\frac{1}{2}$ miles from the former, is Juan Merino point.

The coast is backed by high mountainous land, the peak of Gistral being 3,395 feet above the level of the sea. The peak of Cabaleiros, 4 miles W. by S. $\frac{1}{2}$ S. of Burela point, rises to the height of 1,340 feet.

Currents.—During summer, westerly and north-west currents are constantly experienced, according to the contour of the coast

and the distance from it. The tides reach but a short distance off ; the ebb running west, and the flood east. From June to September the currents set to the W.N.W. about 2 miles an hour, especially off Orrio*de Tapia and Burela point, if the wind is steady at N.E. In winter, on the contrary, the currents set eastward, and off Burela point to the south-east, towards the head of the gulf of Foz about 2 miles an hour when north-west winds prevail. In unsettled weather the mariner should be cautious when navigating in this vicinity.

Fogs are frequent in June and July ; they continue for three or four days, and are almost always preceded by a fresh north-east breeze. In Rivadeo, when Monte Mondigo is covered with fog or haze and the coast westward about San Ciprian obscured, it is a sign of a north-east wind ; but when Mondigo and the coast is clear, a westerly wind may be expected.

FARALLONES de SAN CIPRIAN.—About one mile N. by E. from the Atalaya of San Ciprian, are three rocky islets, named Sombriza, Baja, and Pié. Sombriza, the largest and westernmost, is over 2 cables long, east and west, narrow, and of moderate height. Baja lies half a cable south-east of Sombriza, it is about the same length, and half a cable across. The Pié, the most remarkable of the three, is a nearly circular inaccessible rock, 82 feet high of a reddish colour ; it is distant 70 yards E. $\frac{1}{2}$ N. from Sombriza, being separated by a passage, in which there are rocks that are scarcely covered at low tide, but with $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water between. The passage between Sombriza and Baja is not navigable ; around both these islets, at a short distance, are $4\frac{1}{2}$ and $5\frac{1}{2}$ fathoms, sand bottom, and there are $6\frac{1}{2}$ to 13 fathoms, sand and rock, in the channel between them and the peninsula of San Ciprian.

A rocky bank with 11 to 13 fathoms water over it, dangerous only in heavy seas, lies 3 cables N.E. of Sombriza, and a rocky reef extends one cable from the west point of the islet.

Between Sombriza and cape Morás, which is $1\frac{2}{3}$ miles to the north-west, is a rocky ridge or chain of reefs named San Clemente, which inclines to the southward, with $4\frac{1}{2}$ to $6\frac{1}{2}$ fathoms over it at low water, and the sea breaks on it in north and north-west gales. When there is much sea the best channel lies close to Sombriza, but to use it a vessel must pass 2 cables distant from the islet so as to avoid the reef of rocks which extend off the west point. There is another channel, not so good as the former, between the above reefs and the cape, which may be used by passing one cable from the cape.

The principal passage to the anchorage within the Farallones, is

between them and the peninsula of San Ciprian, but when there is much sea it breaks 2 cables S.S.E. from Baja; and care must be taken to avoid a reef, lying S.E. $\frac{1}{4}$ E. about half a mile from the Atalaya. These dangers are only to be feared in heavy seas, and between them there is a deep wide channel for vessels of the largest draught.

Anzuela, a low rocky islet, lying about half a cable from the north-west side of the peninsula, is one cable long east and west, and nearly covered at high-water springs; about a cable from its northern side are the Leixon du Vendaval rocks, which uncover at half tide.

PORT SAN CIPRIAN is the name given to the anchorage in the little bight on the west side of the peninsula of San Ciprian, between it and Anzuela islet. It will not accommodate conveniently more than 5 vessels of about 100 tons burthen, and they must secure themselves to the rocks of the islet, and to anchors laid out to the southward. The depth is from 3 to $3\frac{1}{2}$ fathoms, sand and weed, but in fresh north-west winds it is only protected from half ebb to half flood, as at high water a considerable sea runs over the islet. Vessels of 200 tons load in the port during the summer season.

A river falls into the south-west corner of the bight, but owing to the little depth on its shifting bar, it is only available, at high-water springs, for vessels under 8 feet draught. A vessel once inside is secure from all winds, with the only inconvenience of lying aground at low water on a bottom of soft mud. The iron works of Sargadelos are 3 miles up the river.

The village of Figueiras is situated on the west side of the peninsula opposite Anzuela islet, and a neck of sand, about one cable long and half a cable wide, forms the isthmus of the peninsula, which is a mass of granite rock with a covering of sand, terminating to the northward in the height called the Atalaya, or Look-out, 83 feet high. The village of San Ciprian stands on rocky ground on the west side of Caosa bay. In north-west gales the isthmus is overflowed, and the communication is then cut off between the villages. Water is obtained in the river. Provisions are scarce.*

LIGHT.—On the north extreme of San Ciprian peninsula is a light-gray-coloured granite tower, which exhibits, at 121 feet above

* See San Ciprian bay and port, on Admiralty sheet of plans, No. 77, scale; $m = 3.4$ inches.

high water, a *fixed white* light, visible in clear weather from a distance of 9 miles.

Tides.—It is high water, full and change, in port Ciprian at 3h.; springs rise about 10 feet, but more or less according to the direction of the wind.

Directions.—A vessel bound to San Ciprian from the eastward should pass between the Farallones and the peninsula; if from the westward, between cape Morá and San Clemente reefs if the water is smooth, or between the reefs and the Farallones when there is much sea. There are two channels into the port—one on the east, the other on the west side of Anzuela islet. The former, although the smaller, is generally adopted, being clear of rocks; the mark through is the Baja on with the Pié astern.

If a pilot is required, one will come out immediately the signal is made, and boats are always ready to render assistance.

When running for the port with a heavy sea from the north-west, sail should be carried to get quickly through it at the narrow entrance; but sail must be taken in and the anchor let go the moment the vessel is inside, as the space is very limited.

Lago bay.—The coast between San Ciprian and cape Morás, 2 miles to the N.N.W., forms a large bight, within which are four bays, with beaches. The smallest, which is nearest the cape, is named Portiño, and the next Lago, from a village on its shore. Lago bay is clean and navigable, with good holding ground, and shelters from south-west and north-west winds. It is much frequented by coasters and by vessels that cannot get into Barquero or Vivero during south-west gales, for there is no difficulty in entering it, and it is free from the heavy gusts of wind encountered in those inlets.

Anchorage.—The best position for a large vessel to anchor, is with the cape bearing N.N.E. and Pié islet (Farallones) E. $\frac{3}{4}$ S., in 11 fathoms, fine sand; outside this there are patches of rock. Should a northerly gale come on, there will be no risk, provided the vessel has good ground tackle; for the rocky bottom, with $4\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water over it, between the cape and the Farallones, breaks the sea considerably. If obliged to abandon the vessel, the crew will be saved by running the boat under the lee of a salient point. If surprised here with a north-east gale, get under weigh on the port tack, so as to weather the cape on the other board. There will be no difficulty in passing between the Farallones and San Ciprian, in depths of 11 to 13 fathoms.

Cape Morás, which is steep, rocky, and 85 feet high, projects to the north-east, and is commanded by elevated land, which reaches 1,250 feet above the sea. On its west side is the village of Morás and N.N.W., half a mile from the cape, is a bank with 13 fathoms water over it, called the Cangrejero.

Anzaron island, 281 feet high, lies $1\frac{1}{4}$ miles N.W. $\frac{1}{2}$ W. from the cape, it is high, rugged, and arid, presenting whitish cliffs to the northward. It lies so close to the coast that at a distance it is blended with it, and difficult to distinguish. It is clean and bold, but there is a rock lying nearly a quarter of a mile to the northward, which must be avoided.

The coast between Anzaron and Roncadoira point, rather more than a mile N.W. by W. $\frac{1}{2}$ W., recedes to the southward, forming Reboira bay, at the head of which is the mouth of the river Portocelo, admitting only boats at high water; and on its west side are two islets.

From Roncadoira point a high and rocky coast, with 23 fathoms water within three-quarters of a mile of it, trends one mile westward to a point, close off which are two islets, named Los Netos; the shore between the points forming a bay, at the head of which there is a small islet, close to the shore.

The Netos, one high, the other low, may be passed at a prudent distance, there being 28 fathoms, rocky bottom, at 2 cables from them.

From thence a steep and rocky coast runs west three-quarters of a mile to Saiñas point, which is low at its extreme, with off-lying rocks, and can be passed at the distance of half a mile. From it Faro point bears W.S.W., 2 miles, and between is a deep bay named Esteiro, the whole of which is rocky and foul, and when there is much sea the breakers reach a long distance from the shore.

PORT VIVERO, the entrance to which is one mile wide, between Faro point on the east and Socastro point on the west, is chiefly resorted to by vessels which in north-west or south-west gales have been driven to leeward of Barquero, or have been unable to gain an anchorage there on account of the violence of the wind. It extends $2\frac{1}{2}$ miles in a S.W. by S. direction, has good holding ground, and affords shelter from south-west and north-west winds on its western shore, and from those from north-east and east on its eastern shore. A heavy sea tumbles in with northerly gales, and a

vessel using it during the winter months should be provided with good ground tackle.*

Both shores are high, bold, and clean, all dangers off them showing above water.

Depth of water.—The depths decrease gradually from 12 fathoms at the entrance to $3\frac{1}{2}$ fathoms near the head of the inlet. Vessels under 11 feet draught can proceed at high water as far in as the bridge at the town of Vivero, through a channel kept open by the tidal currents of the river Landrove, which here falls into the sea; but they lie aground when the tide is out. Large boats can get to Landrove village, about 3 miles up the river.

On the east side of the entrance is monte Faro, a round hill 1,790 feet high, with the ruins of a watch-tower on its summit, the slope of which descends seaward to Faro point; and on the west side of entrance is Socastro point, or Testa de Castro, of moderate height, with rocks at its base. Gabeira islet, a little within the west point of entrance, is of moderate height, and between it and the shore there are $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water in the middle of the channel, which is half a cable across. Between this island and Caballo point, 6 cables to the southward, is a spacious bay, with two beaches, the southern of which, called Abrela, is exposed to the north-east, but coasters anchor off it with south-west winds when they cannot get farther up the inlet. The beach is clean, and the depths gradually decrease from 10 fathoms off Gabeira islet towards the shore.

From Caballo point, Queimada islet, which is close to the shore, bears S.S.W. $\frac{3}{4}$ W., distant 2 cables; the coast here bends to the westward, forming the bay of San Juan, which has several rocks or small islets near its shore, one of which is called Insua, and there are also some steep rocks, called the Castelos del Grallal. Thence commences a sandy flat, which extends about 9 cables eastward, as far as Lavandeiras bay, choking up the head of the inlet; the flat is nearly dry at low water, and the breakers in bad weather are nearly as far out as the parallel of Cillero village. The town of Vivero stands on the eastern shore at the head of the inlet, at the foot of Monte de San Roque, and it communicates with the opposite shore by a bridge of 12 arches, which is continued farther by a causeway 2 cables long. The population in 1877 was 11,330. Small vessels are built here, and some coasting and numerous fishing vessels belong to the town.

* See Port Vivero, on Admiralty sheet of plans, No. 78; scale, $m = 3\cdot5$ inches

The chief exports of Vivero are pitwood, for mines, and sardines ; the chief import being pitch. The aggregate tonnage of vessels of all nationalities that enter the port annually amounts to about 24,800 tons.

There are the ordinary quarantine regulations, but special regulations for the Custom-house came into force in 1884.

There is a hospital for sailors, the charge being from one to two shillings a day, but this fee does not include medicines.

The climate is very healthy at all seasons.

There is communication with other parts by both steam and sailing vessels, and also by electric telegraph.

From the town a high, winding, and in some parts precipitous shore runs in a northerly direction one mile to Cillero village, which is built on an eminence jutting out into the sea, having on its south side the bay of Lavandeiras, so obstructed by sand as to be nearly dry at low water, and on its north a little bight called port Cillero.

The bar at the entrance of the channel leading to Vivero is at the extremity of the most projecting point of the cliff on which Cillero village stands ; and to cross it in a vessel of 9 or 11 feet draught the services of a fisherman of the village must be obtained, as the bar shifts.

Coast.—From port Cillero a high and precipitous shore trends to the northward, and bending eastward forms the bay of Area, with its beach called San Julian. In the northern part of this bay is Area islet, somewhat larger and higher than Gabeira islet ; it lies one cable from the shore, and the space between is full of rocks.

Water, supplies, repairs, &c.—Good water is plentiful in the inlet. Provisions can be obtained at Vivero at reasonable prices, and vessels not exceeding 300 tons can be repaired lying aground, and small defects to machinery can be made good.

Tides.—It is high water, full, and change, at Vivero, at 3 h. ; springs rise 15 feet. With strong south-west and north-west winds the water rises between 4 and 5 feet above its usual level, whilst with those from north-east and south-east it is depressed 3 feet below it. The stream runs 3 miles an hour in the river, and $1\frac{1}{2}$ miles in the middle of the inlet.

Directions.—Estaca point, cape Vares, and Conejera island, are remarkable, and will successively present themselves when approaching Vivero inlet from the westward ; while the Farallones de San

Ciprian, Anzaron islet, and monte Faro, will be known when approaching it from the eastward. Running for shelter either in this inlet or in Barquero in a south-west gale, keep the coast close aboard, and be prepared for heavy squalls and eddy winds off the land. If unable to gain Barquero, endeavour to pass inside Conejera island; for if a large vessel in distress misses Vivero, there are no ports to the eastward but what are barred and difficult to take. In rounding Socastro point, keep at a prudent distance, but so as to get into Vivero if possible without a tack.

Anchor directly the vessel is in 7 or 8 fathoms water, and give her a good scope of cable.

Socastro point cannot be rounded close-to in a north-west gale, for off it is a rocky bank with $6\frac{1}{2}$ fathoms water over it, called the *Có*, which breaks when there is a heavy sea, and the whole extent between it and the point being uneven ground is then covered with breakers.

The *Có* lies 3 cables from the point, and N.E. from Gabeira islet, with the Castelos de Laguete rocks (off the beach of San Roman), on with Socastro point, and the Castelos del Grallal rocks in line with the west side of the inlet. To pass outside the bank, keep the summit of mount Vares, 656 feet high, forming cape Vares, in line with the south-west end of Conjera islet, until the Castelos del Grallal opens clear of the west shore of the inlet. There are 13 fathoms a short distance outside the bank.

Care should be taken to avoid Lage rock, with only 4 feet of water over it, lying W.N.W., nearly 3 cables from Faro point, which otherwise is bold-to.

If unable to enter Vivero in easterly or south-easterly gales, keep the land aboard and endeavour to enter Barquero. Sometimes vessels prevented by strong southerly winds from taking Vivero, anchor in 12 to 14 fathoms off the beach of San Roman to await a change; or they run to the eastward towards cape Morás, and keep under sail between Saiñas point and San Ciprian, where they find less wind; or they anchor in the bay of Lago.

Anchorage.—The best anchorage in Vivero inlet during winter is on its western side in San Juan bay, the bottom there being muddy sand. A good berth is in $4\frac{1}{2}$ fathoms water, with Gabeira islet in line with Caballo point. Southerly winds are frequent, and a heavy sea runs in with northerly gales. In summer vessels anchor more in the middle of the inlet, in 5 to $5\frac{1}{2}$ fathoms. It will be necessary to lift the anchor occasionally, for the bottom is a muddy clay, and

there is great difficulty in breaking it out of the ground if long down.

The coast from the west point of entrance of Vivero trends a short distance westward to the beach of San Roman, it then takes a northerly direction for 2 miles to Ventosa point, 6 cables northward of which is Conejera or Coelleira island. San Roman beach is of small extent, fronted with some conical rocks, named Los Castelos de Laguete; vessels anchor off it in 12 to 14 fathoms in south-west winds, but they must be prepared to leave with the first change.

Conejera or Coelleira island is three-quarters of a mile in circuit, high and steep to the north and north-east, but lower to the south. It is clothed with vegetation, and on its west side is a small cove used as a landing-place. Half a cable off its north extreme is a rock, which breaks when there is much sea from the north-west. There is also a small rock close off the south-west point of the island, with $3\frac{1}{2}$ fathoms water just outside it. The channel between the island and the main is a quarter of a mile wide, and has 9 fathoms water in the middle, but with on-shore gales the sea breaks the whole way across it.

BARQUERO INLET, running in 3 miles to the south-west between Conejera island and cape Vares, is $1\frac{1}{2}$ miles wide at the entrance; it is easy of access, and clear of danger, with good holding ground, sandy bottom, and sheltered from all winds except those from the eastward, but these are not accompanied by any sea to endanger a ship if she has good ground tackling. It is sufficiently spacious to contain a large fleet, and has three excellent watering-places, where boats may water with great convenience. The superiority of this inlet consists in the facility of taking it in bad weather, and being the only refuge for vessels of large draught from all winds, except those from about N.E. to S.E., on the whole Cantabrian coast. The worst wind is a gale from south-west, from the difficulty there is then of gaining an anchorage, as the wind blows out with much force, but in such cases an effort should be made to reach Vares bay south-west of the cape, or Vivero inlet the next eastward.*

Although as a harbour it is not equal to Ferrol or Coruña, it is easier to make in thick weather, the coast is clean and bold, and in approaching it in westerly gales, a vessel does not, as at Ferrol and Coruña, run down on a lee shore.

* See entrance of Barquero, on Admiralty sheet of plans, No. 77; scale $\frac{1}{2}$ = 3·4 inches.

The coasts of the inlet are high and clean, and in many parts approachable to a short distance, but on the western shore between Santa and Campelo points, it is bordered for about a cable from the shore by a bank with 2 fathoms water over it.

Within Santa point is the little port of Barquero, but it is choked with sand, which increases every year, and the narrow channel towards the northern shore is obstructed by a bar which nearly dries. Vessels of 11 feet draught can get up to the town at high-water springs; but with north-east winds, however little sea there may be, it breaks on the bar, and the entrance is impracticable.

The town stands in an elbow on the northern shore, at the foot of a cliff, commanded by high land, about 904 feet above the sea, but it has but few resources.

Between the town and monte Furado on the opposite shore, is the entrance to an inlet called the river Sor, which separates the provinces of Lugo and Coruña, and extends 4 miles in a southerly and south-west direction. There are some deep spots in it with 7 and 8 feet at low water, while in other parts there is scarcely sufficient depth at half tide for large boats over the banks of fine sand and mud, by which it is obstructed. Small vessels resort to it for cargoes of white earth.

Monte Furado is a small hill covered with sand, and terminating in a point to the north-east. Between the hill and Castrelos point is a long sandy beach, from which runs an extensive shallow flat.

The bay on the east side of the inlet, between Castrelos and Videiros points, is called Puerto del Vale; it is 4 cables wide and 2 deep, but being shallow the fishing vessels are hauled up on a clean beach at its head.

About a quarter of a mile farther northward, between points Castro and Congrera, is a small bight, 2 cables wide, named Puerto de Vicedo, off which is considered the best anchorage of the inlet in north-east and east winds. Cuevabaja point, nearly 2 cables N.E. by E. of Congrera point, is high and rocky; thence the coast to Conejera island is high, steep, and safe to approach, but it is exposed to northerly winds.

On the northern shore, about half a mile westward of cape Vares, is the little bay of Vares, where there is a clean beach, and in the north-east part of which coasters are sheltered by a ridge of rocks, extending over a cable in a westerly direction from Bufato point. The village of Vares is situated on the north-east shore of the bay, under mount Vares.

Depth of water.—The soundings in Barquero inlet gradually decrease from 17 fathoms at the entrance, to $3\frac{1}{2}$ fathoms 2 miles within, between points Santa and Castro, where the inlet narrows to half a mile; thence the depths decrease more rapidly, the whole of the inner part being nearly dry at low-water springs, excepting some little channels kept open by the streams of tide.

Water and Supplies.—Water may be obtained at many places in the inlet. The best place is on the south-east shore, close to Congrera point, under Vicedo village. There is, however, an excellent run on the opposite shore, near Campelo point, where two or three boats can water at the same time, even at low tide. In Vares bay it may also be had, although not so good as at the other places. Barquero has good water, and here, as well as at Vares, some supplies may be purchased, but provisions in any quantity must be procured from Vivero, 6 miles inland.

Signal station.—A semaphore station stands on mount Vares, on the west side of the entrance to Barquero, from which vessels can be reported and messages transmitted by electric telegraph, at reasonable charges.

LIGHT.—On Conejera island, at the east side of entrance to Barquero, is a conical light gray coloured granite tower, with a white lantern, which exhibits, at an elevation of 273 feet above high water, a *fixed green* light, seen in clear weather from a distance of 9 miles.

Tides.—It is high water, full and change, at the mole of Barquero, at 3 h. 15 m.; springs rise $10\frac{3}{4}$ feet. The rise is from 3 to 4 feet above the ordinary level with strong north-west winds, and the contrary with those from the north-east. The current in the channel runs 3 miles an hour at springs.

Directions.—The inlet of Barquero is easily recognized from the northward and westward, by cape Ortegá and Estaca point; the cape is known by the Aguillones islets lying about three-quarters of a mile from the shore, and Estaca point runs down rugged to the sea, with a lighthouse on it and some conical islets off it. The coast between this point and cape Vares is high and steep, and a vessel from the westward with south-west winds should keep sufficiently near to recognize it, as the land with these winds is generally much obscured. If the water is smooth, the outer islet off Estaca point may be passed at about a mile or less; but in a heavy sea from the west or north-west, a berth of 2 or 3 miles or more must be given it

according to circumstances. Cape Vares is bold, and may be kept close aboard, but with strong winds from west to south-west heavy gusts rush down it endangering a vessel's masts.

With strong southerly winds, the coast should be approached as near as the dangers off it will allow. If unable to gain an anchorage in Barquero inlet, endeavour to gain that of Vivero, which is equally good with these winds, passing if possible inside the inland of Conejera.

Anchorage.—In choosing an anchorage in Barquero inlet, attention should be paid to the time of year and the prevailing winds. A vessel will be sheltered from north-west gales when cape Vares is eastward of N.N.E.; but a good berth will be found at about 4 cables off Almeiro point, with cape Vares N.E. $\frac{3}{4}$ E. and Conejera island S.E.; in this position a vessel will be well sheltered, and have room to veer or get under way if desired.

During a heavy sea in the offing, the swell comes in round cape Vares, when the smoothest water will be found between Cuevabaja and Castro Grande points; it was here that 20 sail of merchant vessels rode out the heavy gales of 1839-40. Large vessels should anchor in 6 or 7 fathoms water, with Conejera island open nearly its own breadth of the main land.

Sobrepuesta and Santa points are under a high mountain, from whence heavy squalls come down; there is, however, good winter anchorage in their vicinity from south-west and north-west winds for vessels of not more than 11 feet draught; but if there is any appearance of a north-east wind they must shift to the opposite shore.

Coast.—The coast between Estaca point and cape Prior is composed nearly throughout of steep inaccessible rugged rocks, especially from cape Ortegá to Cedeira, and is dangerous to be on in winter with north-west and northerly winds.

Caution.—With north-west and north-east gales, cape Prior and the coast eastward of it should have a berth of at least 6 or 7 miles, to avoid the heavy sea in the neighbourhood of the rocky banks alluded to on page 276, or in case of being becalmed. The same caution should be observed in reference to cape Ortegá and Estaca point, to avoid the calms which sometimes occur in their vicinity, and near the land, with easterly and north-east winds. With south-west winds these points may be passed at a distance of 3 or 4 miles, for the sake of shelter, but it will always be prudent to keep a good offing, especially if the weather is doubtful, or if there is a chance of its being a dead lee shore.

ESTACA POINT, the northernmost of the coast of Spain, is the west extreme of the northern face of the rocky promontory forming the west side of the inlet of Barquero; the other extreme, $1\frac{1}{2}$ miles to the eastward, being cape Vares, which is high, round, and bold; and steep to seaward.

Estaca point extends in a north-west direction in a gentle declivity from the conical hill, 721 feet high, which forms cape Vares, narrowing as it advances into the sea, where it terminates in rugged pointed rocks.

Estaquin islet.—A short distance off the point are two conical rocky islets; the outer being the smaller, and named Estaquin, is half a cable distant from the inner; and a little outside of Estaquin are two rocks scarcely covered at low water. The depth gradually increases seaward, there being 14 fathoms at the distance of one cable, and 22 fathoms, rocky bottom, at 3 cables from the Estaquin. In a gale from the north-west, the sea breaks some distance outside the point, which at that time should be carefully avoided.

Coast.—Between cape Vares and Estaca point, the coast presents a steep and nearly inaccessible front to the northward, and about midway is Moñños point, a rocky projection with rocks some distance off it, which should be given a good berth when there is any sea, or by vessels running along the land at night in fine weather.

LIGHT.—On Estaca point is a round gray-coloured granite light-tower which exhibits, at an elevation of 306 feet above high water, a *revolving white* light, attaining its greatest brilliancy every *minute*, and should be visible in clear weather from a distance of 23 miles. The tower, which is 35 feet high, and adjoins the keeper's dwelling, stands on an eminence $4\frac{1}{2}$ cables S. by E. $\frac{1}{2}$ E. from the outer islet off the point.

Life-saving apparatus.—There is a life-saving apparatus at the lighthouse.

The coast from Estaca point, formed of steep whitish rocks broken by small beaches, takes a W. by S. direction $5\frac{1}{2}$ miles to a rocky projection called cape Celstigos, towards which it gradually becomes high and hilly. The Piedra Mea are two rocks lying close together N.N.W. from cape Celstigos, and nearly three-quarters of a mile from the coast, with $3\frac{1}{2}$ to 13 fathoms water between; they are awash at high water, and the sea always breaks. A vessel should only pass inside them in fine weather, and then close to, for when

there is any sea, the whole channel between the rocks and the point is covered with breakers ; in passing outside give them a berth of at least 2 cables.

Three-quarters of a mile south-west of cape Celstigos is a high steep headland, with a watch-tower on its summit, the shore between forming a small bight with a beach, named San Antonio bay. Carnero or Espante point, one mile westward of this headland, is the extreme of a long tongue of land separating two bays, the northern of which, named Espasante, after the village in the north-east part of it, is spacious and bordered by a beach, but open to the north-west. The southern bay extends $1\frac{1}{2}$ miles eastward, and nearly dries at low water.

CARIÑO INLET.—The Piedra Mea rocks with Marbeira island, N.W. distant $2\frac{1}{2}$ miles from them, form the entrance of Cariño inlet, and from a line between the two the coast forms a bight about 4 miles deep, with arms of the sea running east and west ; the larger and more important being that to the eastward, which leads to the town of Santa Marta, at the most inland part of it.

The western coast of the inlet between Marbeira island and Cariño point forms a bay, with a somewhat steep shore, which may be navigated at the distance of half a mile in 10 fathoms water, sand. Cariño point is the north extreme of Cariño bay, about three-quarters of a mile in extent, which is frequented by coasters, but only affords shelter from south-west winds when not strong, for then the sea renders it a bad anchorage. In the middle of the bay are 3 to 4 fathoms, sand, the depth gradually decreasing to the sandy shore. The town of Cariño stands on the beach in the north part of the bay. Gabeira islet lies about a quarter of a mile from the shore, a little north of Cariño point.

Vessels bound to Santa Marta anchor in 10 to 12 fathoms, east of Cariño point in fine weather, to wait tide for crossing the bar, or to obtain a pilot from Cariño. Mentaron point, the south extreme of Cariño bay, has some rocks off it which are uncovered at high water ordinary tides ; the outer one is steep-to, and may be passed at a short distance in 7 fathoms, sand. From thence the coast continues of moderate height, but high in the interior, to Fraile point, which has a conical islet off it. About a mile to the eastward, off the eastern shore, is San Vicente islet, large, round, and covered with vegetation, having a passage inside it at high water.

Depth of water.—The inlet is navigable as far as Fraile and

Carnero points in mid-channel, with depths gradually decreasing from 18 fathoms at the entrance, to $2\frac{1}{2}$ fathoms near the bar formed between the two points.

Port Santa Marta.—The bar of this port is entirely of sand, and has two openings, one with 15 feet at high-water springs, near Fraile point, and the other near San Vicente islet. The latter channel is the deeper, but the former is preferred, because the channels from it to Sismundi are straighter and more navigable. Within the bar a large sand-bank extends to the south, east, and west, which is for the most part dry at low water, leaving channels for boats and flat-bottomed small craft. There are, however, some holes of 5 to 8 fathoms water, especially near Sismundi, in which vessels anchor rather than lie aground.

Anchorage.—The anchorage off the village of Sismundi is at the mouth of the port abreast a bend of the western shore. The village stands on a hill half a mile inland. Within this anchorage is the port of Santa Marta, but, being obstructed with sand, will only admit vessels of 11 feet draught at high-water springs, and 9 feet at neaps. This draught may go up to the town, off which they can lie afloat if they keep in the channel. The town of Santa Marta, called also Ortigueira, is on the north side of the port; it supplies provisions and good water.

Tides.—It is high water, full and change, at port Santa Marta, at 3h., and half an hour sooner at Sismundi; springs rise 11 feet, and neaps 9 feet. With strong winds outside, the rise is 3 to 4 feet higher.

Directions.—The inlet of Cariño can only be frequented with safety during the summer months. In winter there are but few days that a vessel can enter or depart, in consequence of the heavy seas, whether from N.E., North, or N.W., which are felt in the inlet. A vessel bound to port Santa Marta should touch at Cariño for a pilot, for the mouths of the channels over the bar are constantly changing; but no vessel should attempt to enter except with smooth water, as the bar breaks with the least sea. Having crossed the bar and anchored in one of the deep holes off Sismundi, she will be secure from all winds.

CAPE AGUILLONES, bearing W. by N. $7\frac{1}{4}$ miles from Estaca point, is precipitous and much broken, terminating in numerous sharp peaks, which rise above each other, and attain a considerable altitude. The cape presents a triangular steep front to the north-east, half a mile in extent, rising to a considerable height, and terminating

to the south-east in a point, off which is a rocky islet, named Marbeira, with a passage inside it for boats. At a short distance outside the islet are 10 fathoms water, sand, which depth continues for a mile to the southward, as far as Cariño point.

Dangers.--A chain of high steep sharp-pointed black rocky islets, called the Aguillones, extend in a northerly direction from the cape. The outer one, which is about three-quarters of a mile from the cape, is called Caballo Juan; the next inshore of it, Tres Hermanos, from having three sharp peaks of the same size; the third, Insua Mayor, from being the largest of all; the fourth, Rodicio, is like a pyramid; and that nearest the shore is named the Longa. A sunken rock, the Rocemada, on which the sea always breaks, lies a short distance outside them. There are clear passages between the islets, the least water being 10 fathoms; a mile to the north-east the depth is 28 to 32 fathoms, coarse shells.

CAPE ORTEGAL* or Alto del Limo, nearly 2 miles westward of cape Aguillones, is high, round, and precipitous to seaward, and, when seen from the north-west, it will be recognized by a table-land of different elevations gradually rising to the summit, on the central point of which is the little tower of Limo, 1,829 feet above the level of the sea. From the fall of the cape a small tongue of low land projects, called Limo point, surrounded to the distance of half a cable by sunken rocks, on which the sea always breaks. Half a mile northward of the point is a dangerous rock, with $2\frac{1}{2}$ fathoms water over it, named the Leé; there are 13 to 16 fathoms between it and the point. The point is not easily distinguished when coming from the northward, in consequence of the high land behind, but it may be known by a black cliff of a triangular shape in its vicinity; seen from the north-east, it appears rounded. At 2 miles off the cape the soundings are about 40 fathoms, sand and shells.

Between cape Ortegal and cape Aguillones the coast is high, steep, inaccessible, and dangerous to be near in bad weather. Large sailing vessels should give it a wide berth, when there is much swell or in light winds, and still more so in gales, for the sea is heavier and the currents stronger here than on any other part of the coast.

Current.—In its normal condition and near the land, the flood sets N.E. and the ebb S.W.; but in the offing the direction of the current is regulated by the prevailing winds, running strong when they are fresh from north-east or south-west. The current, however,

* This cape is known to the local mariners as the Alto del Limo, and cape Aguillones as the real cape Ortegal.

sometimes runs against the wind, and even indicates the direction from which it is about to blow. In fine weather a strong current has been observed by the fishermen setting eastward, previous to a north-east wind, which has been stronger in proportion to the strength of the current that preceded it. (*See also* pages 13–15 for Currents and Caution.)

The coast between cape Ortegal and Cedeira may be passed by any vessel at a distance of a mile without risk, but it would be prudent to give it a berth of 3 or 4 miles, and in bad weather 5 or 6 miles, and still farther off in the winter season, when there is an appearance of a gale.

Cuadro point, $2\frac{3}{4}$ miles S.W. by W. $\frac{3}{4}$ W. of the cape, stretches out to the north-west with steep prongs to the sea, and may be recognized by a steep black cliff at its extremity. It descends in declivities from monte Capelada, which has a watch-tower on one of its prominent parts, elevated 2,048 feet above the sea. A rocky islet lies some distance from the point, and 3 miles outside it are 40 fathoms water, rocky bottom.

Candelaria point bears W. by S. $4\frac{1}{4}$ miles from Cuadro point, and the steep coast between forms a bend about $1\frac{1}{2}$ miles deep at the head of which are some high islets named Gabeiras. They lie near the shore, which in the whole of this bight is rocky, without any sand.

Dominigo point, $1\frac{1}{2}$ miles westward of the Gabeiras, has some rocky islets a little distance from it, the largest being precipitous, like the rest of the coast.

Candelaria point is dark and steep, being the termination of a conical mountain, which descends with abrupt declivities to the shore. It may be recognized by the peaks which are formed by the rugged and broken land, and which terminate in isolated rocky pinnacles that decrease in size as they approach the sea. A reef, with two of its rocky heads above water, lies off the point in a north-west direction, and in fine weather fishing vessels pass inside them; from a distance these rocks have the appearance of two fishing vessels some distance apart, by which Candelaria point may also be known. The tower of Candelaria stands on a mountain 1,279 feet high, but from its dark colour and ruinous condition it is scarcely distinguishable.

About $1\frac{1}{2}$ miles farther on is Eigil point, off which, at the distance of 3 cables, is a shoal spot of $2\frac{3}{4}$ fathoms; the point should therefore be approached with caution.*

* There is some doubt as to the existence of this shoal.

The coast to Cedeira is high and precipitous.

Chirlateira or Pantin point, the western point of entrance of port Cedeira, projects northward, and descends in declivities from a hill 535 feet high, named monte Borneira, the foot of which is washed by the waters of the port. This hill, seen from the north-east, assumes the form of a sugar-loaf, and near its summit is a small detached look-out house.

A reef extends northward from the point, which should be given a wide berth. Two of the rocky heads are awash at high water; the outer, named the Meixon, is $1\frac{1}{2}$ cables from the point.

One cable N.E. by E. from the Meixon is the Lage rock, with less than 2 fathoms over it, which breaks with the least sea; and about $2\frac{1}{2}$ cables N.W. $\frac{1}{4}$ W. from the Lage is an equally dangerous rock, with $1\frac{1}{2}$ fathoms over it, named Nieto.

Another rock, called the Peton, lies $6\frac{1}{2}$ cables N.W. of the Lage, but it has 7 fathoms over it, and is only dangerous in heavy seas. From it Sarridal point, in port Cedeira, is in line with the Meixon; and between it and the Nieto are 15 to 23 fathoms water, and a short distance outside 18 to 23 fathoms. There are 13 and 15 fathoms between the Mexion and Lage, and the same depth between the Lage and Nieto.

About a cable inshore of the Nieto is the Badaxeira rock, with $1\frac{1}{2}$ fathoms over it; and S.E. of this, distant another cable, is the Punxallo rock, with only $1\frac{1}{4}$ fathoms, and the first to show its breakers; between the two latter rocks there are 11 and 13 fathoms, and the same depth between them and the shore.

PORT CEDEIRA is only adapted for vessels of light draught, for in the most sheltered part the depths are small. It is a port of refuge, and conveniently situated for small craft, which, in strong north-east winds, cannot round cape Ortegal. In these winds it is easily entered, and shelter from the sea is gained directly the entrance is reached. The anchorage is well sheltered from north and north-west winds, if they do not blow hard, but in a gale the swell is inconvenient; the holding ground of sand, however, is excellent, and with good ground tackling there is no risk. Large vessels can find outer berths, but necessarily exposed; if drawing more than 11 feet, they should under similar circumstances run for Coruña in preference to this port.*

The entrance, 8 cables wide, and open to the north, is between the rocks off Chirlateira or Pantin point and the Blancas, which are a

* See Port Cedeira, on Admiralty sheet of plans, No. 78.

group of white rocks above water, lying three-quarters of a cable from the eastern shore. Escaleiron islet, lying to the northward of the Blancas, is clear and connected with the shore. A rocky shoal, with $2\frac{3}{4}$ fathoms water over it, is said to lie $1\frac{1}{2}$ miles N.E. of Chirlateira point.

Depth of water.—Port Cedeira is only adapted for small vessels, drawing 11 to 13 feet. There are 12 to 17 fathoms at the entrance, decreasing gradually inside to 3, $2\frac{1}{2}$, and 2 fathoms, over sand.

A conspicuous white church, the chapel of San Antonio, is situated $3\frac{1}{4}$ cables E. $\frac{1}{2}$ N. from Sarridal point, and is a good mark for recognizing the entrance.

The Medio Mar or Half-tide rocks, lying nearly in the middle of the port, three-quarters of a mile within the entrance, have always breakers on them when there is any swell on; when uncovered they show three heads. There are $4\frac{1}{2}$ fathoms in the channel, on their western side, and 5 fathoms in that on their eastern side. The latter channel is preferred, between the rocks and Sarridal point, on the heights of which are the ruins of a battery. This point, and the shore which trends to the S.S.E., may be passed at a short distance, until the ruined fort of Concepcion appears standing on a high precipitous point. A small bay will then open out, with a beach, called Arenalonga, off which is the best anchorage.

From this the shore continues eastward, and then turns northward to the town of Cedeira, which stands at the foot of monte Eigil, which is 820 feet high. The town is not seen from the anchorage; its principal front being to the north-east. It can only be approached at high water, for the eastern part of the port is encumbered with an extensive flat, which dries at low tide. A small rivulet runs past the town, and the inhabitants communicate with the opposite bank by a bridge of 6 arches and a causeway. Excellent water may be had in abundance, but provisions are scarce.

LIGHT.—A *fixed white* light is exhibited from a tower erected on Robaleira point, in the inner part of the port and south-west of the town of Cedeira. The light is elevated 89 feet above high water, and visible from a distance of 9 miles, but it will only be seen from seaward when the mouth of the port is open.

Tides.—It is high water, full and change, in port Cedeira at 3h.; springs rise 15 feet. The rise is 4 feet higher with north-westerly

gales, and 4 feet lower with those from the eastward. The greatest strength of the stream is one mile an hour.

Directions.—This port is easily recognized at a distance by monte Borneira; by the chapel of San Antonio, which is half-way up a hill on the eastern shore, and, being white, shows out distinctly from the dark ground (*see* page 273); and by monte Eigil, which rises from the eastern part of the port, and has on its summit the ruins of a tower. A vessel from the westward should not approach Chirlateira point nearer than 2 miles until the entrance of the port is open, and the whole of the white sand of Loira at the head of the port is seen, when she may run in, keeping the eastern shore aboard, giving the Blanca rocks a berth, and passing midway between the Medio Mar and Sarridal point. Vessels generally take up a berth in $2\frac{1}{2}$ fathoms with the castle on Sarridal point in line with Chirlateira point, and moor north and south. Small craft run farther in.

The port is easily entered with north-west and north-east winds, but it would not be prudent for a square-rigged vessel to attempt it when they blow strong from the opposite quarters, especially from south-west, for on nearing the entrance the wind draws ahead and comes down in hard squalls. Candelaria point, open of Eiras point southward of it, leads outside the rocks off Chirlateira point.

Frouxeira point is 5 miles westward of Chirlateira point; it is low, round, and has several rocks off it, some under water and others uncovered. Between Chirlateira point and Prados point, which is nearly 3 miles to the south-west, the coast is high, dark, and precipitous, with several small projections, forming bays with sandy beaches. One of these projections is called Torrella point, and the largest and easternmost of the bays is Pantin bay, and Pantin village stands a short distance inland.

On the east side of Frouxeira point commences Frouxeira beach, which extends in an E. by N. direction for $1\frac{3}{4}$ miles, the sands of which become higher towards the interior. The beach is clear of danger and may be approached, especially at its eastern end; and a vessel driven towards it in bad weather may entertain the hope of saving the crew by making for this end, which is not so shallow as the other part. The sand is recognized at a considerable distance, from its height and whiteness. At the eastern end of the beach is the entrance of the Frouxeira lake, which is shallow, and the channel into it will only admit fishing vessels at high water.

The shore south-west of Frouxeira point is low, backed by high land, with small bays as far as the slope of monte Campelo, which

rises to the height of 752 feet above the sea. The largest and most useful of these bays is that called Porto Novo, which is resorted to by coasters for shelter in north-east winds, and is even used in northerly winds, but it must be left the moment there is an appearance of the wind becoming north-westerly, for should it freshen from this quarter the loss of the vessel is nearly certain. There are 5 to 6 fathoms water in the bay, sand bottom, and it is terminated by a beach. The entrance is at the extreme of the eastern slope of monte Campelo, which is high, and when seen from the north-west presents the form of a large saddle, but from the north-east it appears conical; the eastern point of entrance is high, and appears like an island, and may be recognized by a conical rock near it.

There are from 20 to 50 fathoms water at 2 miles off the coast between Cedeira and cape Prior, but in strong north-west winds a berth of 8 or 9 miles should be given to Frouxeira point, as a heavy sea gets up in that locality.

CAPE PRIOR, $7\frac{1}{2}$ miles W. by S. from Frouxeira point, is the western extreme of a rocky peninsula of moderate height, which presents a steep front nearly $1\frac{1}{2}$ miles long to the north-west. The beach of Comba bay on the east side of this peninsula, and that of San Jorge on the south, both low, and being separated by a narrow strip of land, give to it the appearance of an island when approaching it either from the south-west or north-east. From the north-west it is backed by the high land of the interior, but it will be recognized by the several small peaks on its summit, one in particular being prominent and conspicuous, and 620 feet high.

Some islets and rocks, named Cabalo, extend $1\frac{1}{4}$ miles from the north-east extreme of the peninsula. The islets are small, with the exception of one, which is high, but the sea breaks on the rocks with the least swell.

The beach of Comba bay on the east side of the peninsula is bold, and terminates in the plain of the same name. Between the bay and monte Campelo to the north-east the coast is steep, and of moderate height. The bay and beach of San George, called also Do-rios, on the south side of the peninsula, is formed between Cela point on the north, and Erbosa point on the south. This bay is $1\frac{1}{4}$ miles wide, and one mile deep, and shelters from north-east and south-east winds, but be careful not to be caught in it with on-shore winds. Cela point is rocky, and the steep dark land rises from it to the cape. Erbosa point is low and steep, and off it is an islet of the same name, with a channel inside it for small vessels in moderate weather.

Nearly a mile south-west of Erbosa point is Gabeiras point, off which distant about 2 cables are two barren rocky islets, named Gabeiras, connected by a reef, over which boats can pass at high water. Between them and the shore is a channel, which, although narrow, is sufficiently deep for coasters in case of necessity. A rocky bank, with 9 to 18 fathoms water over it, runs in a north-west direction from the islets.

Between Gabeiras point, and a rocky projection called Serantes or Golfín point, $1\frac{1}{2}$ miles to the southward, is the sandy plain of Doniños, off the beach of which vessels may anchor, with winds between N.E. and S.E., in 8 to 12 fathoms, fine sandy bottom.

Inland, and not far from the sea, is the Doniños lagoon, and in the neighbourhood the town of the same name. The lake is of an oval form, east and west, and carries 39 feet water. It has no visible communication with the sea, and its margin is lined with reeds

LIGHT.—In the middle of the slope of the cape, and on the cliff which projects to the north-east, is the light-tower of cape Prior, which exhibits, at an elevation of 446 feet above high water, a *fixed white* light, visible in clear weather from a distance of 15 miles. It is obscured southward of E. by N. $\frac{1}{2}$ N. The building is white, octagonal, and the tower rises from its centre.

BERMEO BANK, said to lie about N.N.W. $3\frac{1}{2}$ miles from Frouxeira point, and N.E. $\frac{1}{2}$ E. $7\frac{1}{2}$ miles from cape Prior, is a mile in extent and steep-to, its rocky sides declining suddenly from 16 to 40 fathoms water. It is generally considered that from 9 to 12 fathoms is the least water, but the position of these depths has not been ascertained; it is, however, possible that rocky heads of even less depths exist, for, with strong north-west winds, breakers have been seen on the bank. Another small bank, with 18 fathoms over it, is said to lie one mile north of the Bermeo.

The currents off cape Prior are generally produced by the wind. In passing the cape, therefore, with a north-west wind and much sea, it should be done with caution, as the current is then strong and sets towards the shore. With moderate winds and smooth water, a small vessel may approach the cape, and avail herself of the tidal stream, but a large ship should give it a berth of 2 or 3 miles. In the bend of the coast between cape Prior and the Sisargas islands to the south-west, and generally on the whole north-west face of the peninsula, the currents are very strong, especially when combined with the heavy sea from that quarter. In moderate weather the current follows

the course of the wind, except near the coast under the influence of the tides, where the flood sets eastward and ebb westward, forming eddies in the bays and off the salient points, but it is difficult to ascertain the exact limit of its range.

CAPE PRIORIÑO.*—Cape Prioriño chico is the south, and cape Prioriño grande the west extreme of a tongue of land projecting in a south-west direction from monte Ventoso, and which, from its resemblance to cape Prior, has received the name of cape Prioriño. Cape Prioriño chico, forming the north-west point of the entrance to Ferrol, is of moderate height, rocky, dark, and may be approached by vessels of any size to the distance of a cable: about half way up its southern face is a quadrangular building with a light-tower rising from its centre, and at the foot of it the ruins of a battery, scarcely visible from its dark colour. Cape Prioriño grande, about half a mile to the north-west, is of the same height, somewhat similar in appearance, but more bluff; a reef projects less than half a cable from its southern part, and the coast between the capes is beset with rocks.†

Monte Ventoso, rising to the height of 735 feet, about $1\frac{1}{2}$ miles north-east of the cape, is easily recognized from its isolated position, and from the watch-tower, telegraph and semaphore station on its summit, and vessels can communicate by the International code. Its western and northern slopes terminate at the sea, and at the beach of Doniños to the north-east.

Lajinas Shoals are two patches of 17 and 12 fathoms, with from 21 to 40 fathoms round them, lying respectively 4 and 3 miles W. by N. $\frac{1}{4}$ N. from cape Prioriño.

Cabezos de Osas is a shoal spot of 17 fathoms, with from 24 to 32 fathoms round it, lying $2\frac{1}{4}$ miles W. $\frac{1}{4}$ N. from cape Prioriño.

LIGHT.—The light-tower on cape Prioriño chico exhibits, at an elevation of 89 feet above high water, a *fixed white light*, varied every *two minutes* by a *red flash*. The light is visible in clear weather from a distance of 12 miles, but it is obscured northward of a N.N.W. $\frac{1}{4}$ W. bearing.

* **Measured mile beacons.**—Two of the beacons, which from a distance resemble telegraph posts, stand in the neighbourhood of the lighthouse on cape Prioriño Chico, and the other two on Coitelada point.

These beacons are good marks for distinguishing the entrance to Ferrol.

† See Admiralty chart:—Ferrol harbour to cape Finisterre, No. 1,755; scale, $m=0.5$ of an inch; Ferrol harbour, No. 80; scale, $m=3.9$ inches; and Ferrol Coruña, and Betanzos inlets, No. 79; scale, $m=1.6$ inches.

FERROL HARBOUR.—From cape Prioriño the coast recedes to the south-east, and forms a large bight, about 6 miles wide, in which are the inlets of Ferrol, Ares, Betanzos, and Coruña. Ferrol, the northern inlet, running eastward about 8 miles, is the best of the four, as it shelters from all winds, being enclosed by high land on all sides. From its mouth between cape Prioriño chico and Coitelada point, which bear N.N.W. $\frac{1}{2}$ W. and S.S.E. $\frac{1}{2}$ E. from each other, distant nearly $1\frac{1}{2}$ miles, the two shores incline towards each other, and about $1\frac{1}{2}$ miles within, they form a narrow entrance channel or strait, $1\frac{1}{2}$ miles long and in some parts barely 2 cables wide, within which is a spacious harbour capable of sheltering a fleet, and numerous small vessels in the indentations of its shores. Its great capacity, convenient depth, excellent holding ground, and more especially its arsenal and basin, constitute it one of the best and safest military ports of Spain.

The town of Ferrol,* about half a mile eastward of La Graña, is divided into three parts—the old town, the modern, and the part named Esteiro. The old town, forming the western part, occupies the summit and slope of a hill about 260 feet high, the new town extends east and west from the foot of this hill to near Esteiro, which occupies the eastern part; the whole containing a population, in 1887, of 24,000, and surrounded by a strong wall and numerous batteries. On the south side of, and lying parallel to the new town, is the spacious basin, a magnificent work, half a mile long and a quarter of a mile wide, with its opening to the south. It is surrounded by the workshops and other buildings which together compose a considerable arsenal, and on its eastern side, facing Caranza cove, is a building with twelve slipways. Between the building yard and the new town are the soldiers' barracks, a large handsome square building, which serves as a mark for vessels entering the harbour.

The chief imports are coal, iron, machinery, timber and cotton, the average annual value being £320,000. The chief exports are pitwood, petroleum, and old iron, the average annual value being £78,000. The average number of vessels of all nationalities that enter the port annually is 900, representing an aggregate tonnage of about 125,000 tons.

There is frequent steam communication to Spanish ports, and also to England. A daily coach runs to Betanzos to join the railway from Coruña to Madrid, and there is telegraphic communication to Coruña, Rivadeo, and Santa Marta.

* Revised from information furnished by H.B.M. Vice-Consul, at Ferrol, June 1887.

The Custom-house and quarantine regulations are the same as at all other Spanish ports. There are no wharf dues.

There is no special hospital for sailors, but there is a private one where they are admitted provided they have no contagious disease, the fees being from 1s. 6d. to 2s. 6d. per diem, including food and medicines. There is a military hospital.

The climate of Ferrol is mild, both in summer and winter, and there are no diseases for which special precautions are necessary.

Repairs to vessels.—All sorts of repairs to hull and machinery may be effected at the Royal dockyard, but the work is rather slow ; and as there are a great many formalities to be gone through, much time is lost. There are two private building yards at La Graña, where repairs to hull can be effected afloat, but only small pieces of machinery can be repaired as yet ; in a short time, however, they will be in a position to do all kinds of repairs, and to build steam engines up to 3,000 h.p. A dry dock is to be built at the private yard, which will admit vessels not exceeding 393 feet in length.

Docks, &c.—There are two dry docks at the Royal Arsenal, the largest being 474 feet, extreme length, with a depth of 31 feet over the sill at high water ordinary spring tides, and breadth of entrance 78 feet. The Spanish iron-clad *Vitoria*, which is 311 feet in length, and drawing 28 feet of water, is the largest vessel which has been admitted into this dock.

The other dry dock is only 256 feet long.

There is also a patent slip 183 feet long.

There is a fitting shop, travelling cranes, all sorts of machinery, large foundry, where cylinders and other large castings are made ; smithery, containing steam hammers and forges. A complete set of block-making machines ; 100-ton sheers on the jetty, and 40-ton sheers and careening dock proposed.

Coal.—About 1,000 tons of Cardiff, and small quantities of Newcastle and Scotch coal are generally kept in store, the usual price being 25 shillings per ton delivered alongside. For large quantities a lower price is usually charged.

Steamers are coaled by means of lighters loading from 20 to 50 tons each. Quick despatch can be obtained.

Water and supplies.—Ferrol has abundance of water, and excellent provisions at reasonable prices. It contains ample supplies of all kinds, both for sailing and steam vessels.

Buoys.—There are two large mooring buoys lying about 2 cables south of the entrance to the steam basin.

Anchorage.—The most available part of the harbour is on the northern shore between the town of Ferrol and that of La Graña. This space, named Serantes bay, from the river of that name which runs through the beach at its head, may be considered as the port, from the excellent shelter it affords from all winds. Large vessels anchor in the middle of the bay, in 8 to 9 fathoms, good holding ground; small vessels, to have more complete shelter, lie nearer La Graña, and merchant vessels nearer to Ferrol, to be convenient to the wharves. At the west end of the town of Ferrol there is a mole for the use of merchant vessels.

A rescue station is maintained at Ferrol.

Jubia bay.—After passing Ferrol, the shores of the harbour gradually approach each other and trend in a north-east direction $2\frac{1}{2}$ miles to its head, which is called the bay of Jubia, from the river of that name which falls into it. This river is navigable at high water as far as the bridge, and its waters serve the works of a copper factory. It is observed that the depth increases every year in this bay, while it diminishes in that of Malata or Serantes, owing probably to the eddy the tide makes in turning the angle of the arsenal. On the south shore of the harbour are the village of Seixo and the town of Mugardos.

Cariño bay, on the northern shore of entrance to Ferrol, is $1\frac{1}{2}$ miles wide, 5 cables deep, with depths of 8 to 12 fathoms over sandy bottom, and is much resorted to in north-east or south-east winds by vessels that have not sufficient daylight to work into the harbour. The bay is sheltered from north-west and north-east winds, and is considered tolerably secure from all others, for those from the southward do not blow home, and bring no sea with them.

Anchorage.—The best berth is in 8 to 12 fathoms, a quarter of a mile off the beach at the head of the bay; but a vessel intending to enter the harbour should anchor farther out, with the channel open.

CHANNEL to FERROL.—The two shores of the channel are rocky and barren, excepting some patches of cultivation on the northern shore in Leusada bay, where there are several magazines and other buildings. The land on either side is high, monte San Cristóbal, on the northern side, being 466 feet, and monte Faro, on the southern, 871 feet above the level of the sea.

Depth of Water.—The general depths in the channel are 8 to 10 fathoms, sand, gravel, stones, and shells, but there are holes of 13 to 15 fathoms in the narrows between the castles of San Martin

and San Felipe. A vessel may anchor in any part of it where the lead gives sand and gravel, but avoid the southern shore, where the bottom is not good, and there are several rocks.

San Carlos point, on the north shore, is rocky, shelving, and crowned by a fort, which, with fort Segaña on the opposite shore commands the channel, which is here only 3 cables across. Three-quarters of a mile east of fort San Carlos, and on the same shore, is the castle of San Felipe, one of the principal defences of the entrance. It projects a little distance from the shore, and parts of the walls are washed by the sea, but the water is shallow in its vicinity, especially on its western side, and a reef with 14 feet water over it projects about a third of a cable from its south side. From thence the shore recedes to the northward, forming Leusada bay, in which, at 80 yards from the northern shore, and N.W. by W. $\frac{3}{4}$ W. from Bispon point, is the Pereiro rock, which shows at low water. Bispon point has some rocks lying a short distance off it, and forms, with Redonda point on the opposite shore, the eastern mouth of the channel. Papabreas rock, which is close to the shore, lies a short distance west of Velhas point.

Coitelada and Segaña points, the south points of entrance, are rocky and of moderate height, and between them is Chanteiro bay, with a beach of sand and a hermitage at its head. Segaña point is commanded by a hill, on the western side of which is a fort, and on its summit a little watch-house, having a semaphore to repeat signals from the station on monte Ventosa. This point must be given a good berth in scant winds, for besides the rocks bordering it, some of which are above water, there is the Muela rock, with 6 feet water over it, off its north side, half a cable outside the rocks above water.

The Muela is about 20 yards in extent, the weeds on it generally show its position; it is marked by a red beacon buoy.*

Bispon point, just shut in with the point of mount Christóbal (Velhas point), which is the first point west of the castle of San Felipe, leads north of the Muela rock in $5\frac{1}{2}$ fathoms, and no vessel should approach nearer; and the same point just shut in with the south-west angle of the barracks at Ferrol (a large square building seen in the direction of the channel), leads well clear in 7 fathoms. From Segaña point the south shore of the channel runs eastward $1\frac{1}{4}$ miles to the point and castle of San Martin, between which and the point of monte San Christóbal the distance is only 2 cables, but both points are bold, and free from danger.

* The buoyage of Ferrol cannot be depended upon.

Batel rock.—At 6 cables eastward of Segaña point is the Batel rock, which dries one foot at low water springs. It lies about one-third of a cable off shore, and from its summit San Carlos castle bears about N.N.E. $\frac{1}{2}$ E., and San Martin castle nearly East.

Farther eastward, lying a short distance from the shore, are two rocks named Cabaliño and Cabalo, about 70 yards apart. The Cabaliño, the westernmost rock, lies 80 yards from the shore, and from its round summit, which is awash at low water springs, the south angle of San Carlos castle bears N. by W., and the south-east angle of San Felipe castle E. by N. $\frac{3}{4}$ N. The Cabalo has three heads, which dry 8 feet at low water.

Leiras point lies $6\frac{1}{2}$ cables to the eastward of Redonda point, and off which shoal water extends one cable. Monte San Cristóbal, in line with Bispon point, clears the shoal water off Leiras point.

Palma shoal.—Palma castle has a reef projecting N.W. one-third of a cable from it; and lying parallel to the shore at the distance of one cable is the Palma shoal, about a cable in extent east and west, formed by three pinnacles of rock, with deep water between. The least depth of 24 feet is upon the central pinnacle; from it the south point of San Felipe castle bears W. by N., Palma castle S.S.W. $\frac{1}{2}$ W., and Bispon point E. $\frac{1}{2}$ N.

There is a narrow channel, having 6 fathoms of water, between Palma shoal and the reef extending from Palma castle. Vessels of more than 23 feet draught should pass to the northward of the Palma shoal; and when midway between Palma and San Felipe castles, steer N.N.E., until monte San Christóbal, bears W. by N. $\frac{1}{2}$ N.; then steering E. by S. $\frac{1}{2}$ S. should take a vessel on a mid-channel course, until Bispon point is passed.

Another reef extends a third of a cable in a N.E. direction from Redonda point, so called from its round form, between which and Bispon point on the opposite shore the distance is a little over 2 cables, but the channel is narrowed to $1\frac{1}{2}$ cables by the reefs which project from both points.

LIGHTS.—On the salient point 110 yards east of Palma castle, on the south side of the channel, about $1\frac{3}{4}$ miles within the entrance, is a conical white tower, which exhibits, at an elevation of 38 feet above the mean level of the sea, a *fixed red* light, visible 8 miles. There is also exhibited from the mercantile mole at Ferrol a *fixed white* light, visible 4 or 5 miles.

Tides.—It is high water, full and change, in the harbour of Ferrol at 3h.; ordinary springs rise 15 feet, neaps $9\frac{1}{2}$ feet. The rise is one or 2 feet higher at the equinoxes, and also with strong south-west winds. The tidal stream runs $2\frac{1}{2}$ miles an hour at springs, and about one mile at neaps; but it is much stronger in the channel, where there is an eddy close to both shores. The flood sets towards Segaña point, which must be guarded against with scant winds.

Winds.—The prevailing winds at Ferrol are north-east in summer, and south-west in winter. The north-east wind is attended with clear weather, and is only interrupted by south-west or west winds of short duration. It sets in regularly at 10h. a.m., and dies away in the evening. If it should happen to prevail in the winter, it will be attended with thick cloudy weather and rain.

South-west winds blow with great strength, and bring dirty weather. They come down in heavy squalls, and a vessel should be provided with good ground tackling. Even in summer they are attended with bad weather, and the whole coast outside is obscured. Westerly and north-west winds clear the sky, and although they blow strong and throw in a heavy sea, they are fair for taking the harbour.

Southerly winds are the most disliked, for besides the thick weather with which they are attended, they blow with such violence that they do not admit of the port being gained if the vessel falls to leeward of it.

Directions.—Cape prior is a good landfall to make when bound to Ferrol from the north or north-east; and from the westward the inlet may be recognized from a considerable distance by the break formed by mounts Ventoso and Faro, which rise abruptly from the shore. The best winds for a sailing vessel to enter with are those from S.W., round westerly, to North. Cape Prioriño may be rounded at the distance of half a mile or less, as there are 11 and 12 fathoms water one cable from it, but a wide berth must be given to the Cabalos rocks, which lie about half a cable south of the cape; and after passing cape Prioriño chico, about half a mile to the south-east, steer to the eastward, keeping in mid-channel, or borrowing on either side according to the wind. Take care to avoid the rocks and ledges bordering the shores of the channel, especially the Muela rock—which is marked by a buoy—off Segaña point; and should the vessel draw more than 23 feet, it will be requisite to keep to the north of the Palma shoal (*see* page 282). If blowing fresh from the south-west or south, be prepared for the heavy squalls which come down from monte Faro.

Having passed Bispon point, haul to the north-east for an anchorage, which may be chosen as convenient. Merchant vessels anchor between La Graña and Ferrol. Vessels of war requiring repair enter the basin, and those ready for sea anchor off it; but this is an uneasy berth, especially in winter, when with southerly and south-west winds the squalls come down with much fury. There is a rocky patch with 5 fathoms water over it, some 24 yards in extent, lying S.S.E. $\frac{1}{2}$ E. 4 cables from the entrance of the basin, with the east point of entrance touching the house of a windmill, a remarkable building in the highest part of the town.

With adverse winds the harbour should be entered on the flood, in consequence of the many boards the vessel would have to make in turning through the narrows; but it will be prudent for a stranger to take a pilot, who will come out as soon as the signal is made, but if the weather is such as to prevent it, one will remain at Segaña point. If the wind be too strong to work to windward, the vessel will find excellent shelter in Cariño bay, or she can bear up either for Ares or Coruña, and wait for a favourable wind.

In fine weather and a fair wind there will be no difficulty in entering Ferrol, or gaining an anchorage in Cariño bay, as the entrance is well pointed out by the *fixed white* light, varied every *two minutes* by a *red flash*, on cape Prioriño chico, and by the *fixed red* light near Palma castle on the south side of the channel.

CAUTION.—It is not prudent to approach Ferrol or Coruña at night with thick weather from the south-west, as the lights on the coast cannot be seen, the position of the vessel may be affected by currents, and these winds are nearly always accompanied by stormy weather. It will be better then to wait for daylight off the Sisargas islands. Should a vessel fall to leeward of the port, the only alternative would be, if unable to carry sail and work to windward, to make for Cedeira, Barquero, or Vivero.

ARES and BETANZOS INLETS, formed in the deep bight between Ferrol and Coruña, have sufficient depth for vessels of all sizes; but as the deep-water space is exposed to north-west and west winds, they are only frequented by vessels whose draught will allow of their running farther in for shelter. Ares inlet occupies the north-eastern portion of the bight, and Betanzos inlet the southern portion. Both have good holding ground, and are free from rocks, with the exception of the dangerous Miranda bank, lying nearly in the middle of the entrance of the bight, and the Serron de la Torrella, lying on the opposite shore. 4 cables E.N.E. of Torrella point, and

marked by a buoy ; these, however, are to a certain extent useful in sheltering the anchorage from the heavy north-west seas.*

Anchorage.—If with strong north-west winds a vessel finds herself off the entrance of this bight, and unable to get either into Ferrol or Coruña, anchorage may be taken directly the vessel is eastward of the Miranda bank, with the certainty that, if the ground tackling is good, the anchor clear, and a hundred fathoms of chain given, however hard it may blow, there will be no risk of dragging.

Between Coitelada point south of the entrance to Ferrol, and Avarenta point is a small bay called Oreoso, in which fishing boats take refuge in north-east winds. On the south-east side of the Avarenta point is a cove, which shelters coasters from the north-east. Thence to Miranda point, the coast forms a bay with depths of 4 to 12 fathoms water, sand and stones.

Marola islet, lying on the opposite shore, about 4 cables N.W. $\frac{1}{2}$ N. from Deixo point, is about 50 feet in height, dark and conical, with a small islet a short distance off its north-west side. There is a channel with 6 to 7 fathoms water, rocky bottom, for small vessels, between them and the land. Another islet, named Corbal or Marobiña, lies about one cable from the point, with a passage inside for small craft.

Torrella point, nearly one mile eastward of Deixo point, is of moderate height, with rocks at its foot, and 4 cables E.N.E. of the point is the Serron de la Torrella, with 3 fathoms water over it, rocky bottom, and it must be given a good berth with heavy north-west seas, as it is then covered with breakers. The reef is marked by a buoy. From thence the coast trends in a south-east direction nearly 2 miles to San Amade point forming a bay, at the head of which are the two small beaches of San Pedro and Cerno.

Miranda point and islets.—Miranda point is low and rocky, and off it are the Miranda islets, connected with the shore by a reef of rocks which dry at low water. The largest islet, which is the outer one, is 45 feet high and nearly circular ; the next, called Mirandita, is smaller and of a conical form ; the others are bare rocks, and the group extends about 3 cables in a west direction from the point.

Miranda bank, lying W. $\frac{1}{2}$ S. half a mile from the outer islet, is a dangerous rocky reef, $1\frac{1}{2}$ cables in extent E.N.E. and W.S.W., with three heads on which there are not more than 6 feet at low water,

* Tunny fishing nets are laid in Cirro bay, between Torrella point and San Mamed point, about three-quarters of a mile from the shore. The nets are buoyed.

and in bad weather the whole extent is covered with breakers. The channel between it and the islet has $5\frac{1}{2}$ fathoms water, sand and rock, and is sufficiently wide for any vessel in moderate weather, but when there is much sea it would be dangerous even for a small vessel to attempt it. With smooth water the bank is indicated by the eddies over it.

The marks of the shoalest water on the bank are, cape Prioriño grande in line with Coitelada point, and the tower of Hercules at Coruña in line with Deixo point. To pass between the bank and the islets, keep cape Prioriño grande shut in with Coitelada point; and to pass outside the bank, keep cape Prioriño chico well open of the point, or the chapel on monte Bremao a little eastward of S.E. by E. $\frac{1}{2}$ E., until the beach of Raso opens of Ares point.

Ares bay is formed on the north side of Ares inlet, between Ares point and castle on the west, and Mauron or Camoco islet on the east. It is somewhat less than a mile wide, half a mile deep, and affords good shelter to small vessels from north-west and north-east winds; but the want of deep water obliges those of large draught to keep well out, and consequently exposed from south-west and north-west; with strong north-west winds a heavy sea sets into the bay, when vessels in the outer anchorage, if their draught will admit, should run to the eastward, and anchor off Redes in $2\frac{1}{2}$ fathoms, over a bottom of soft mud, where there is better shelter.

The bay is bordered by a beach, but there are some rocks off Raso and Cascada points, between which is the sandy plain of Raso. The town of Ares stands on the western shore.

Ares castle stands on the heights of Ares point, 85 feet above the sea. South-west winds throw in some sea, but with good ground tackling there will be no risk. A vessel and her crew may be saved by running her on the beach between Peña Cascado point and the outskirts of the town. Water may be obtained from a fountain a short distance from the beach to the eastward of the town. Supplies are scarce, and must be brought from Ferrol. There is no pier, and mercantile operations are carried on in boats.

Mauron or Camoco islet, off the east point of the bay, is about 60 feet high, and covered with vegetation. It is so close to the shore that the smallest vessel can scarcely pass inside it at high water. There are some rocks nearly one cable off the shore to the westward of it.

Anchorage.—Coasting vessels anchor off the town, but the water here is so shallow that it is necessary to be some distance from the

shore to be in 9 or 10 feet. The bottom of the bay is mostly fine sand. The regular traders anchor with the guard-house on with the castle, 2 cables from the point, in $2\frac{1}{2}$ fathoms, good holding ground. Larger vessels anchor farther out in 4 to $4\frac{1}{2}$ fathoms.

In entering the bay, give Paella point a berth of 2 cables, and Ares point a berth of one cable in passing.

Tides.—It is high water, full and change, in Ares bay, at 2h. 30m.; springs rise 12 feet, but the rise is affected by the prevailing winds, being one or 2 feet more with south-west winds, and one or 2 feet less with those from the north-east.

Redes bay, at the head of Ares inlet, between Mauron islet and Leusada point, is about 6 cables wide and $1\frac{1}{2}$ miles deep, and, although open to westerly winds, affords shelter to small vessels, and safety to others from its excellent holding ground.

The town is small, and built on a declivity of the land, in a small bight on the north side of Redes point. The church is conspicuous, and stands on a height to the north-east of the town.

The head of Redes bay is filled with sand-banks, which are nearly covered at high water. The two shores trend in a south-east direction to the bridge across the mouth of the river Eume, which here flows into the sea. The bridge communicates with the town of Puentedeume, which stands on the south-west shore. Coasting vessels can get up to the bridge at high water. Monte Breamo, rising to the height of 968 feet above the sea, to the south-west of the town, is an excellent mark for approaching the inlet, and easily recognized. It has a chapel on its summit dedicated to San Miguel.

Depth of water.—The depth in Redes bay is not more than 14 or 15 feet eastward of the meridian of Redes castle, which is a ruin standing on the heights of Redes point on the northern shore; but the bottom being soft mud, a vessel may ground without risk. If drawing 12 to 14 feet, the town of Redes may be brought to bear N. by W. and Torrella point open of Mauron islet about W. by N.; if of lighter draught nearer the shore.

Larger vessels will obtain some shelter by anchoring in $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, mud bottom, in the middle of the bay between Mauron islet and Redes castle. This berth is exposed to the westward, but no injury will occur if the vessel's head is kept to the sea by a small anchor to the eastward, to prevent the ebb stream from the Eume swinging her broadside on. With the castle and church in one, there are $3\frac{1}{2}$ fathoms at low water.

BETANZOS INLET is 2 miles wide at the entrance between San Amade and Curbeiroa points; from thence it takes a south direction 3 miles to its head, which is nearly choked with sand, and into which fall the rivers Mandeo and Mendo. At 4 miles up these rivers is the town of Betanzos, standing on the declivity of a hill, the base of which is washed on the east by the Mandeo and on the west by the Mendo. Boats can get up to the landing place at high water springs, but at low water the sands remain dry.

From San Amade point the west shore of the inlet runs S. by E. $\frac{1}{2}$ E. $1\frac{1}{2}$ miles to Fontan point, on which is a castle in ruins. Carcabeiro islet lies close to the point, the channel between being used by small craft. The islet is surrounded with rocks, and at about half a cable south-east of it, is a rocky shoal called Piedra Do-Porto, with 6 feet water over it, which is marked by a buoy. Another similar shoal named Pulgueiro 2 cables S.W. of Do-Porto shows at low water springs. Pulgueiro lies about $1\frac{1}{2}$ cables from the shore.

The village of Fontan stands in an elbow of the shore, a short distance south-west of Fontan point. About one mile south of Fontan castle is another castle in ruins, on Curbeiroa point, and on the beach of the bay between, is the town of Sada. Coasters only can approach the town, as the bay is daily becoming more shallow. Opposite Fontan castle, on the eastern shore, is a shallow bay, called Bañobre, at the head of which a river of the same name falls in the midst of a sandy beach.

Depth of water.—The depth gradually decreases from 7 fathoms at the entrance of the inlet to one fathom at 2 miles within; thence upwards it is all dry at low water springs, excepting the channels into the rivers.

Anchorage.—Vessels of moderate draught will find good shelter from south-west winds by anchoring in 3 to 6 fathoms, sand, East or E.S.E. of the castle on Fontan point. Small vessels, by standing farther up the inlet, according to the draught, will be sheltered from west and even north-west winds.

CORUÑA BAY, the entrance to which, between Seixo Blanco (white stone) point and the north-east extreme of the peninsula of Coruña, is nearly 2 miles wide and 3 miles deep, but being open to northerly and north-west winds, shelter can only be had on its western shore, at the port and town of Coruña. The northern shore of the peninsula is foul and rocky, and near its north end is the light tower of Hercules, standing on an elevation.

Seixo Blanco point on the east side of entrance is high, steep, free from rocks, and distinguished by a vein of white stone up and down its face, appearing from a distance like a road.

Depth of water.—The depths decrease gradually from 20 fathoms at the entrance, to 5 fathoms near the head of the bay, the shores of which are fringed with rocks.

The eastern shore is foul, as well as the southern part, in which is the mouth of the river Burgo. Various islets and rocks are scattered along the shore at a short distance; the most remarkable of which are, Cadabal between Seixo Blanco and Mera points; Santa Cruz on which there is a fort, and Judios near St. Lucia.

Mera point, in the north-east part of the bay, is higher than Seixo Blanco point, and has a battery on it. On its south side is a tolerably spacious bay, bordered by a beach, in which shelter may be had from north-east and south-east winds, in 8 to 10 fathoms, sand; but it should only be resorted to in fine weather, and then the Tonina bank, lying outside the entrance, must be carefully avoided, for although there are 10 fathoms over it, the water sometimes breaks.

The entrance to the port is half a mile wide, between an islet, on which is the castle of San Antonio, to the north-east, and San Diego point and castle to the south-west. The port takes the form of a horse-shoe, nearly three-quarters of a mile deep in a north-west direction, and at its head is a narrow isthmus, which unites the peninsula to the main land.

On the southern part of the peninsula is the town of Coruña, which with its suburb contained, in 1886, 40,000 inhabitants. The suburb, named Pescaderia, adjoins the city and occupies a great part of the isthmus.

Goods are landed and embarked in front of the Custom-house, until half-ebb, when the water alongside the quay becomes shallow.

The chief exports are, cattle, onions, pitwood, hams, &c., valued in 1889 at £228,311; and the chief imports are, coal, machinery, petroleum, &c., valued in 1889 at £869,551.

725 vessels of all nationalities entered the port in 1889, representing an aggregate tonnage of 451,452 tons.

There is no dock accommodation, but repairs to machinery, such as breaking of crank shaft, have been successfully carried out. The repairs to hull requiring a dry dock would necessitate a vessel proceeding to Ferrol. Supplies to shipping can be readily obtained.

There is steam and telegraphic communication to nearly all parts of the world, and a line of railway to Madrid, Paris, Vigo, &c.

There are no special Custom-house or quarantine regulations, and there is no lazaretto except at Vigo.

Coruña is considered extremely healthy, and there are no diseases for which special precautions are necessary. There are two hospitals, the military and civil, the latter being utilized by the English Consulate for British seamen.

Anchorage.—The port of Coruña will only completely shelter vessels of moderate draught, as the deep water space is limited. There are 4 fathoms in the middle of it, good holding ground, which depth rapidly decreases towards the town and the suburb. The best berth is towards the south-west shore, in $4\frac{1}{2}$ or 5 fathoms, mud, abreast the Palloza, a large cigar manufactory in the district of Santa Lucia. Vessels of heavy draught anchor eastward of the meridian of the castle of San Antonio, and consequently exposed to the sea with northerly winds.

Winds.—Southerly and south-west winds are the most dangerous, and vessels should be prepared for the wind from those directions. When it blows strong either from the north or south, there is an uneasy sea in the port, and mercantile operations are interrupted.

Coal.—About 1,000 tons of coal are usually kept in store, the price being 23 shillings per ton, and vessels are coaled at the anchorage in the bay by means of barges, as there are no wharves at which a vessel can coal alongside.*

Water may be obtained from the watering place in the Playa de la Palloza, or from a floating tank, but it is not always good for drinking purposes. 1890. The water supply of the town is likely to be much improved.

Life-saving apparatus.—There is a life-saving apparatus at Coruña.

LIGHTS.—The tower of Hercules, on the north end of the peninsula of Coruña, exhibits, at an elevation of 332 feet above high water, a *fixed white* light, varied by a *flash* every *three minutes*, and visible in clear weather from a distance of 16 miles; the flash is seen in clear weather 20 miles.

To facilitate the entrance of the port at night, a *fixed white* light is shown from an hexagonal green tower on the east side of the castle

* From information furnished by H.B.M.'s Consul. Coruña. July 1887 and 1890.

of San Antonio, 56 feet above high water, and visible in clear weather 10 miles.

From the extremity of the embarkation mole, a *fixed red* harbour light is shown at an elevation of 29 feet above high water, and visible in clear weather from a distance of 6 miles.

DANGERS in Coruña bay.—The entrance of this bay is obstructed in bad weather by a rocky bank, named the Jacentes, a mile in extent E.N.E. and W.S.W., with depths over it varying from $5\frac{1}{2}$ to 18 fathoms. From the middle of the bank Seixo Blanco point bears S.E. by E. nearly $1\frac{1}{2}$ miles, and the tower of Hercules W.S.W. about the same distance. The most dangerous part is a tolerably extensive patch with $5\frac{1}{2}$ to 9 fathoms over it, named the Basuril, at the southern end of the bank. When there is much sea the whole bank is covered with breakers, and in heavy gales the breakers extend as far as Seixo Blanco point, and occasionally also, across the passage between the west side of the bank and Hermino point, in which case the entrance must not be attempted.

The eastern shore of the peninsula, from Pradeiras point, on which is a battery, to San Antonio castle is foul and rocky, with reefs projecting from it, of which the Pedrido is the most dangerous. This reef extends in an N.N.E. direction from the Peña de las Animas, which is a small rugged rock 18 feet above high water, lying N.E., 2 cables from San Antonio castle, and having a channel one cable wide, obstructed with rocks, between it and the shore. About one cable farther to the eastward is the Mouron rock, with 2 fathoms water over it, being the continuation of the reef projecting from the Peña, and on which the sea always breaks.

The Cabanes bank, lying N.E. $\frac{1}{4}$ E. a long three-quarters of a mile from San Antonio castle, is about 2 cables in extent, N.E. and S.W., has $8\frac{1}{2}$ fathoms least water over it, rocky bottom, and like the Jacentes is covered with breakers when there is much sea. There are 11 to 13 fathoms between it and the Pedrido reef, and 17 to 19 fathoms between it and Pradeiras point.

There are also two dangers in the entrance of the port, one a small patch with 5 feet over it, named the Gancho, lying 20 yards S.S.E. of the castle of San Antonio; and the other a round rock with 12 feet over it, called the Laja de Monelos, lying about half a cable from the west shore of the port, off the mouth of the Monelos, a small stream which runs through the sand near Judios islet. A small patch of 6 feet lies one cable N. by E. from San Diego castle.

Buoys.—On the south side of the harbour of Coruña and in the

fairway, three large wooden buoys are sometimes moored, having iron supports for lanterns; they are moved at night to rocks and broken ground, as guides to the fishermen in hauling their nets.

Pilots.—All merchant vessels above 50 tons are compelled to employ a pilot in entering Coruña. A vessel requiring one should make the usual signal at the fore.

Port regulations.—Masters of vessels should make themselves acquainted with the port regulations, as any infringement may render them liable to be fined.

Tides.—It is high water, full and change, in the port of Coruña, at 3h.; springs rise 15 feet, and neaps 9 feet, but the rise is affected by the prevailing wind.

CAUTION.*—The coast between capes Ortegal and Finisterre is dangerous to approach at night, especially in the winter season, or in thick and foggy weather, which is frequent here, for not only does a powerful current at times set towards the land from the north-west, but the streams of flood and ebb often draw vessels out of their computed position. In the dark gloomy weather of winter the land is often concealed, but the beaches at the foot of the hills may sometimes be seen, when the latter are obscured in mist and haze, and it should be remembered that the 100-fathoms line passes just 10 miles from cape Finisterre, and also from cape Ortegal. The most prudent course to adopt by vessels bound to Ferrol or Coruña from the westward, and not having sufficient daylight to enter the port, is not to advance farther eastward than the meridian of the Sisargas isles ($8^{\circ} 50'$ W.), where they should stand off and on during the night according to the state of the wind, bearing in mind that there is always a slight indraft towards the land.

With fresh south-west winds, the current sets with great strength to the north-east between the Sisargas islets and cape Ortegal, and vessels have often been carried by it to leeward of their port; this must be carefully guarded against, for if they be driven eastward of Ferrol there is no place of shelter or safety on the whole coast, except the inlets of Cedeira, Barquero, and Vivero. The lead should be frequently hove, especially in hazy weather, for the soundings will be a warning before the surf on the shore can be heard. (*See* page 302.)

* According to a statement furnished by Lloyd's, the following are the losses in the neighbourhood of cape Finisterre, between the years 1877 and 1882 (inclusive), namely :—Wrecks, 15; losses by collision, 7; foundered, 8; abandoned, 6.

Directions.—The bay of Coruña should not be attempted when the breakers extend across the entrance, which they occasionally do when the sea is heavy from the north-west. In smooth water and fine weather the Jacentes and Cabanes banks may be crossed, but when there is any swell they should be avoided, and the channel used between them and the shore.

In entering the bay with a fair wind and smooth water, run towards the land between Seixo Blanco and Mera points, until San Diego castle opens of San Antonio castle; then steer towards San Diego castle, keeping it its own breadth open of San Antonio castle to clear the Pedrido reef, which should be given a berth of a quarter of a mile in passing. San Antonio castle may be rounded at the distance of a cable, and anchorage taken up between the two castles as convenient.

A good berth for a vessel of large draught is with San Antonio castle bearing N.E. by E., but if drawing less than 3 fathoms, she may stand farther in until Seixo Blanco point is between the castle and the city. Before dropping the anchor the nature of the bottom should be ascertained, for in many places there is much sea weed, on which the anchors come home in bad weather.

If attempting the bay in a heavy gale between North and West, the best channel is between the Jacentes and Herminio point, under the tower of Hercules. To do this, run along north-east of the tower, at such a distance from the coast as to see the base of the tower, which in no case should be hidden when approaching Herminio point, which may be neared if requisite to 2 cables. From thence steer S.E. towards the battery on Mera point, until San Diego castle opens of San Antonio castle, when proceed as before.

If wishing to run between the Jacentes and Seixo Blanco point, which is not so good a channel as the other, approach the entrance of Ferrol until cape Prioriño grande bears N.N.E., and Segaña point is in line with the hermitage of San Cristóbal, which is eastward of the cape in the bay of Cariño. Then steer about S.W. by W., with this latter mark on, until Seixo Blanco point bears E.S.E., then S.W. by S., and proceed as before. In working into or out of the bay, when within Mera point, do not stand further eastward than to have Seixo Blanco point in line with monte Ventoso; in making the western board, keep San Diego castle well open of San Antonio castle, to avoid the Pedrido reef.

Sailing vessels leaving the port should do so, if possible, with the land wind early in the morning, so as to be clear of the bay before the breeze comes from seaward.

The coast from the north end of Coruña peninsula takes a westerly direction, and at the distance of 19 miles is San Adrian point, close off which are the Sisargas islands; the shore between forming a bight over 3 miles deep. Orzan bay, on the west side of Coruña peninsula, is nearly one mile deep and half a mile wide, and open to the north; it is foul, and shallow, and terminates in the beach of the isthmus of Coruña. Nearly $1\frac{1}{2}$ miles W. by N. $\frac{1}{4}$ N. from Hercules tower is Peña Boa point, moderately high and rocky, descending in declivities from monte Peña Boa, more generally known as San Pedro. The mount is 732 feet high, and on its summit is a tower and telegraph station, from which signals are made to vessels coming to Coruña, and is an excellent mark. This station is in telegraphic communication with Corcubion, which is in connection with the semaphore station at Finisterre.

Close off the west side of the point are three small islets, named San Pedro, which are parallel to the shore.

Langosteira point, nearly 3 miles W. $\frac{1}{2}$ S. from monte San Pedro, is moderately high, and has on each side of it a bay with low shores.

Pero Dente bank is a small patch of 11 fathoms, with 28 fathoms round it, lying $2\frac{1}{2}$ miles N.W. by W. $\frac{1}{4}$ W. from San Pedro isle.

Pego rock.—A rocky patch with $2\frac{1}{2}$ fathoms water over it, named Pego, lies W. $\frac{1}{2}$ N. 2 miles from Langosteira point, and $1\frac{1}{2}$ miles from the nearest shore; the tower of Hercules kept open of the land leads outside it.

Ferbedoira and Curbina rocks.—There is also a rock named Ferbedoira, two-thirds of a mile W. $\frac{1}{4}$ N. from San Pedro isle, and another, the Curbina, at about a mile N.W. by W. $\frac{1}{4}$ W. from Cayon tower. At 5 miles from Langosteira point in the same direction is the small harbour of Cayon, used only by fishing vessels; it is formed at the foot of monte Samon, which is high and flat on the summit.

About 4 miles farther westward, is a small rocky islet lying close to the beach of the low shore of Baldayo. To the northward of this islet lies the dangerous rocky bank of Baldayo, several heads of which are visible at low water, but at high tide only the middle rock shows itself. The bank is about $1\frac{1}{2}$ miles long, north and south, and half a mile wide, with south-west winds vessels pass between it and the land.*

* Tofiño mentions "the southern part of this bank as being one mile from the shore, and the channel between half a mile wide, with 15 fathoms water in it, so that in a case of necessity vessels of large draught might run through;" in the chart by Don Juan De Dios Sotelo, published at Madrid in 1847. the channel is about $1\frac{1}{4}$ miles wide, and the outer rock full 3 miles about N.E. $\frac{1}{4}$ N. from Razo point at the west end of Baldayo beach. The *Solway* steam vessel was wrecked on this bank 7th April 1843.

Shoal patches.—A shoal patch of $6\frac{1}{2}$ fathoms, called the Cueva de Pomba, lies about E. $\frac{3}{4}$ N. three-quarters of a mile from the north end of Baldayo bank, and $2\frac{1}{2}$ miles further on, in the same direction, is the Atalayero bank of 11 and 15 fathoms. Both these patches are surrounded by depths of 28 fathoms.

From Razo point at the west end of Baldayo beach, which is about 3 miles in extent, the course is N.W. $\frac{1}{2}$ N. $5\frac{1}{2}$ miles to San Adrian point, and clear of danger, with the exception of some rocks close to the shore, and a rocky ledge extending one-third of a mile from San Bartolomé point. Nearly $1\frac{1}{4}$ miles S.S.E. $\frac{1}{2}$ E. from San Adrian point, is the Atalaya de Malpica, a point of high land projecting eastward about 2 cables, and having on its south side a cove named port Malpica, suitable only for fishing craft, and on its north side, a spot of low beach visible from seaward; here rises monte San Adrian, 589 feet above the sea, extending north and south, its north extreme being San Adrian point.

SISARGAS ISLANDS are separated from San Adrian point by a narrow passage which may be used in a case of emergency. The lighthouse on the western island is one mile N. $\frac{3}{4}$ E. from the point, and at high water the two appear as three islands, of which the western, called Mayor, is the larger, 330 feet in height, with steep sides; it is round, with a flat summit, and is one-third of a mile in diameter; its north end is a little higher than the south, and on the second northern peak is the lighthouse. On the east side of the larger island lies the second, called Atalayero, so close to the first at the north end as only to admit small craft to pass through at high water. Atalayero is steep on the north side, but low on the south, and in the middle of it is a depression, through which the sea passes at high water, dividing it into two parts. The ground around the group is almost wholly rock, the few patches of sand interspersed being of small extent.

About one-third of a mile W.S.W. from the south-west end of the western or large island, is a depth of $3\frac{1}{4}$ fathoms on the north part of a rocky reef called Carreira, on which the sea breaks even with a moderate swell; and about a quarter of a mile N.N.W. from the north-west point of the same island, lies the Campana shoal which is nearly awash. A long mile N.N.E. from the north point of the island, is a rocky shoal with $5\frac{1}{2}$ fathoms water over it, called the Cuervo. A reef of rocks extend eastward from Atalayero; and another 5 cables from its south point towards San Adrian point. The narrowest part of the passage between the islands and San Adrian

point is between the south extreme of this latter reef and the large rocks under the point, the channel here being not more than $1\frac{1}{2}$ cables across.

Mayores bank is the shoal water of 9 and 10 fathoms which extends about three-quarters of a mile, to the northward and eastward, of the Sisargas islands.

LIGHT.—On the second northern peak of Mayor island, the larger of the Sisargas islands, is a lighthouse, which exhibits, at an elevation of 351 feet above high water, a *fixed white* light varied by a *red flash* every *four minutes*, visible in clear weather from a distance of 12 miles.

Life-saving apparatus.—There is a life-saving apparatus at the lighthouse.

Directions.—In case of emergency a vessel may run between the Sisargas islands and the land, observing that in this passage the tides are strong, the flood to the east, the ebb to the west, and that with any swell there is broken water all over it.

If coming from the westward, steer for the south point of the western or larger island on a S.E. bearing, until within half a cable of it; the vessel will be then clear of the Carreira and Campana reefs, and have a depth of 14 and 15 fathoms. From thence stand for the east part of San Adrian point, carrying the same depth until within half a cable of the point, where it shoals to 8 fathoms; then steer East, passing between the point and the extreme of the reef extending from the south point of Atalayero. When bound through the passage from the eastward, steer for San Adrian point to the distance of half a cable from it, and when abreast the point, steer for the same distance from the south end of the large island, and then N.W. until clear of all dangers.

THE COAST takes a W. $\frac{1}{2}$ S. direction from San Adrian point, and is much broken and indented with bays. Nariga point, $3\frac{1}{2}$ miles west of San Adrian point, is of moderate height, and steep, with reefs extending nearly three-quarters of a mile off it. About one mile eastward of this point, is a small bend of the coast called port Avarizo, frequented by coasters; a reef of rocks lies in the middle of the entrance, but the western shore is clean, and should be kept aboard in entering.

From Nariga point the coast runs southward 2 miles, and then westward $3\frac{1}{2}$ miles to Roncudo point, forming a bay open to the north-west, and in which are several rocks. Roncudo point is of moderate height and forms the base of a lofty mountain which has a

number of small eminences on it, which at a distance resemble buildings; a reef extends W. by N. 3 cables from the point, the outer part of which is uncovered, and there are other rocks in its vicinity.

Caution.—The whole of this coast, from Avarizo to Roncudo point is fringed with rocks, some of which extend nearly a mile from the shore.

Corme and Lage bays.—Roncudo point forms the north-east extreme, and Lage point, distant $2\frac{1}{2}$ miles, the south-west extreme of a deep bight, open to north-west gales, when it is generally covered with broken water; but there is no danger except the reefs off the points of entrance, and a patch of $4\frac{1}{2}$ fathoms lying S.S.W. about one mile from Roncudo point.

There are two summer anchorages in this bight, one, Corme bay, in its north-east corner. and the other, Lage bay, in its south-west corner; in winter it will be prudent not to enter either, unless in a case of necessity, when Corme bay should be preferred, where with good ground tackle a vessel may ride safely.

An abundance of fresh water will be found in both bays. At the head of Corme bay there are three different spots of low shore; in each of which is a stream where a squadron may conveniently water. Vessels anchor off the low shore in 7 or 8 fathoms water, sand, with a cable fast to the shore on the north, and an anchor to the south, lying safe from all winds except the south, which sometimes blows hard, but with good cables there is little danger to be apprehended, as the bottom is good holding ground.

At the east end of the beach is an islet, difficult to distinguish from the land, with a hermitage on it; thence a high and steep coast runs southward to Canteros point. From Canteros point begins a tract of low beach, extending to the head of the bight where rises monte Blanco, which is sandy, from halfway up to the summit, and a good mark from seaward. The river Canduas here falls into the sea.

Lage bay has at its head a clean beach, and there is an abundance of fresh water. An anchorage should be chosen in the middle of the bay in $8\frac{1}{2}$ fathoms water, with Cabalo point, the east extreme of the bay, in line with monte Blanco; but small vessels may take up a berth nearer the town in 4 or 5 fathoms. Lage point, the south-west extreme of the bight, is high, and surrounded by reefs which extend to the distance of 2 cables.

Catasol point, $1\frac{1}{2}$ miles south-west of Lage point, is high and of a sandy colour, with rocky and shoal ground extending fully

half a mile from its foot ; on its north-east side is a low sandy shore, and on its south-west side is another called Arenal de Traba de Lage. The small bay of Camello, 4 miles westward of Lage point, has shoals at its entrance, and is used only by fishing boats.

Cape Trece, about $4\frac{1}{4}$ miles further on, is low and foul, and two-thirds of a mile north-west of the cape are some rocks named Baleas de Tosta ; a little way back from the point, the land is high and rugged, terminating in peaks, and extending from Camello bay to cape Villano.

CAPE VILLANO is of steep rock 220 feet in height, with a lighthouse on it. A peak of a red colour with a sharp point rises at its back, which at a distance resembles a tower.

The conspicuous sand patch on cape Veo, $3\frac{1}{2}$ miles eastward, will also serve to point out the position of cape Villano.

Bufardo rock.—About half a mile N.N.W. from the cape lies the Bufardo rock, awash at low water, being the pinnacle of some sunken rocks of small extent, on which the sea breaks, but all round it the water is deep.

Caution.—Nearly the whole of the coast, from Lage point to cape Villano, is fringed with rocks, some of which extend nearly three-quarters of a mile from the shore.

LIGHT.—The hexagonal white lighthouse near the extreme of cape Villano exhibits, at an elevation of 243 feet above high water, a *fixed white* light, visible in clear weather from a distance of 10 miles. The light is obscured by a hill, on which a new lighthouse is in course of construction, from about S. $\frac{1}{4}$ E. to S. by W. $\frac{1}{2}$ W., when distant less than 4 miles.

CAMARIÑAS BAY, southward of cape Villano, is somewhat obstructed by rocks and shoals, and frequented only by coasters. Merejo bay, on its southern shore, has excellent clean holding ground, in 4 to 7 fathoms water, sheltered from all winds, except north-west, which send in a heavy sea ; it is therefore seldom used, and on the appearance of the wind coming from this quarter a vessel should be prepared to gain the anchorage off Camariñas on the northern shore.*

Casa Santa or Cuerno point, half a mile south-west of cape Villano, is low, with some islets, called Cuerno, and rocks extending 2 cables from it, the greater number of which are visible, and steep-to.

* See Admiralty plan :—Camariñas bay ; scale, $m = 1\cdot0$ inches. on Chart No. 1,053.

One of the rocks, on the south-west side of the point, is named Betanzeira. About $1\frac{1}{2}$ miles south of the cape is a round hill named Monte Farelo, or del Virgen, on the summit of which is a white house, forming a good landmark when making the entrance; the coast between should not be approached too close, as off it there are one or two outlying rocks; one of which, the Farelo, is about $1\frac{1}{2}$ cables from the nearest shore. Three-quarters of a mile south-eastward of Monte del Virgen, is an old fort on a point, and 4 cables farther eastward is a new fort on a point, which should be given a wide berth, as there are only $2\frac{1}{2}$ fathoms water 2 cables southward.

Close to the north-east of this latter point, stands the town of Camariñas on the shore of a small sandy bay, with a small pier used by coasters at high water, but it dries when the tide is out. To the north-east of the bay is the entrance of a shallow inlet which runs northward for nearly a mile; a short distance southward of the entrance is a small river, the Puente del Puerto, with a bar at its mouth.

Merejo point, on the south shore of Camariñas bay, which has a fort on it, is high and steep, with a small town of the same name on the summit. Between this point and Chorente point, two-thirds of a mile farther westward, is Merejo bay, with two rivulets running into it. Chorente point is high and precipitous, and a quarter of a mile off it is the Higuera shoal, about the size of a boat, with only 6 feet of water over it. About three-quarters of a mile north-west of Chorente point is the town of Mugia, on the beach at the head of a clean sandy bay, and on the south side of a hill with a rugged summit. The north side of this hill terminates in Barca point, on which is a large and conspicuous house or chapel, which is bordered with breakers, and at 2 cables north of the point is the Peneiron rock.

The Quebrantas, off the entrance of Camariñas bay, is a dangerous rocky shoal about half a mile long, N.N.W. and S.S.E., with depths of $1\frac{1}{4}$ to 6 fathoms over it, except at the north end, which at low water shows a head of rock resembling a buoy. From this end of the shoal, which is called the Great Quebranta, cape Villano bears N.E. by E. $\frac{1}{4}$ E., distant $1\frac{1}{2}$ miles, and the chapel on Barca point S. $\frac{1}{4}$ W. $1\frac{3}{4}$ miles.

The south-east end of the shoal is named the Small Quebranta, and the above chapel bears from it S. $\frac{3}{4}$ W. distant $1\frac{1}{2}$ miles; it has $1\frac{1}{2}$ fathoms water over it, and the sea breaks during a swell; and in bad weather the water breaks all over the shoal.

Shoal.—About $1\frac{1}{2}$ miles W. by N. $\frac{1}{2}$ N. from the Great Quebranta lies another rocky shoal with $5\frac{1}{2}$ fathoms over it, on which the sea breaks during a heavy swell from the westward.

Meixon de Juanbou.—The Meixon de Juanbou, a shoal of 4 fathoms water, lies N.W. $\frac{1}{2}$ N., $1\frac{1}{10}$ miles from Barca point, and one mile from the Great Quebranta.

Water may be had in abundance at the town of Camariñas.

Tides.—It is high water, full and change, at Barca point, Camariñas bay, at 3h. ; springs rise 15 feet.

Directions.—Entering Camariñas bay with the wind from the eastward, keep cape Villano aboard, taking care to avoid the Bufardo rock, which will be known by its breakers, and may be passed on either side. The rocks off Cuerno point may be approached to a quarter of a mile, as they are steep-to. From thence steer to pass half a mile from Virgen point, and when midway between the two points of entrance, haul to the eastward by the lead, giving the inner points a berth of a third of a mile, when with a couple of short boards, a vessel will gain the anchorage abreast, and a short half mile from the beach of Camariñas, in $4\frac{1}{2}$ fathoms, sand. The most dangerous wind is from the southward. Several vessels that have parted their cables in southerly gales, have been saved by running ashore in the inlet at the head of the bay.

If the wind is too strong to allow a vessel to turn in, temporary anchorage may be found where convenient in the bay ; or she may run into Merejo bay, which is safe with all winds but those from the north-west. Entering with westerly winds, give a wide berth to the Quebrantas shoal, and run in mid-channel between it and Barca point.

CAPE TORIÑANA or TOURIÑAN.—Nearly 2 miles westward of Barca point is the high and steep point of Buitra, and between, the coast forms a bight open to the northward. Near Barca point, a flat beach of the same name, is almost entirely covered when there is much swell and a high tide, all the way to the town of Mugia. Cape Toriñana, 3 miles from Buitra point, is low and rugged, and at a distance it is not easily recognized, being blended with the high land at its back. A short distance off its western face is a small rocky islet, high and round, with two small peaks and shoals around it. A reef of sunken rocks runs from the cape nearly a mile to the north-eastward.

A lighthouse is being built on cape Toriñana, near the summit of the peninsula, and caution is requisite in thick weather not to mistake it for cape Villano lighthouse, which latter is on a ridge of irregular rocks.*

CAUTION.—Mariners are warned not to make too free with this dangerous coast, off which it is more than probable that there are other dangers than those marked on the charts. In May 1833, H.M. steam vessel *African* struck on a sunken rock, from which cape Finisterre was said to bear S. by W., and cape Toriñana E.S.E., distant one mile. This rock had been seen previously from H.M.S. *Confiance*, when the sea was breaking over it. The Spanish steam vessel *Santander*, in May 1863, is reported to have struck upon a rock in this vicinity, in all probability the same.

Tofiño states that W.N.W., 2 cables distant from cape Toriñana, there is a sunken rock on which the sea breaks when there is any swell; this may be identical with the *African* rock, as the Spanish chart of 1847 shows only one rock, lying about W. $\frac{1}{2}$ N. two-thirds of a mile from the north extreme of the cape, and half a mile from the nearest shore.

Farelo rock lies W.N.W., half-a-mile from Cape Toriñana.

CAPE FINISTERRE.—The Navé of Finisterre is 9 miles S. by W. $\frac{1}{4}$ W. from cape Toriñana, the coast between forming an indentation; and 4 miles from cape Toriñana is Nemiña point, with the bay and beach of the same name on its south side. Nearly mid-way between Cape Toriñana and Nemiña point, is Mt. Gordo point, situated under Mt. Gordo. Vessels may safely anchor off the beach in Nemiña bay during north-east and easterly winds, in 6 fathoms, sand (but not in deeper water, for there the bottom is rocky), abreast a rivulet, where water may be obtained; the north shore of the bay is foul. From thence to the Navé the coast is bold, with some small bays and patches of beach, but none of them deserving notice.†

The Navé is high land with a flat summit, 780 feet above the sea, having at its foot cape Navé, which is washed by the sea; about one-third of its height above the sea is a short projection with hummocks upon it. A small but high island lies at the foot of the Navé.

* A provisional light is about to be exhibited.

† See Admiralty chart:—Cape Finisterre to cape St. Vincent, with Plans, No. 87; scale, $d=6$ inches; also chart cape Peñas to Pontevedra bay, No. 1,053; scale $m=0.2$ of an inch; and San Ciprian bay to cape Finisterre, No. 1,755; scale, $m=0.3$ of an inch.

Cape Finisterre, $2\frac{3}{4}$ miles farther on, is neither so high nor so flat as the Navé, but more uneven on the summit. Without being precipitous over the sea, it is of steep ascent, and landing under it, even in the most favourable weather, is extremely inconvenient. It will be easily recognized at sea by the lighthouse on its south point, and also between it and the Navé there is a bight with some low beach, and the land behind is less elevated. It may be further distinguished by the coast trending from it to the east and north, and by Monte Ezaro or Lezaro, 1644 feet above the sea, to the E.S.E. of it, which may be known, not merely from its height, but from its singular formation, as its summit consists of numerous small pinnacles resembling the teeth of a saw.

Rocks and shoals.— $1\frac{3}{4}$ miles N.W. by W. $\frac{1}{4}$ W. from the Navé is a small ledge, named the Muniz, with 3 fathoms water, upon which the sea breaks in bad weather; it is steep-to, having 20 to 30 fathoms around.

About 3 cables from point de los Oidos or Enquieira, the north-west point of the cape, is the little rocky islet of Centolo; and N. $\frac{1}{2}$ W., half a mile from this islet, is a small ledge named Carraca, with $2\frac{3}{4}$ fathoms over it at low water. One mile from the shore off point los Oidos lies a pinnacle rock named Peton de Mañoto, with 9 fathoms water over it and 32 fathoms close around; the sea nearly always breaks on this rock. Three-quarters of a cable S.S.E. of the cape is Petonciño rock, and 3 cables S.W. $\frac{1}{2}$ W. from the extremity of the cape is the Turdeiro rock, about the size of a boat, with $1\frac{1}{2}$ fathoms water over it;* and nearly a mile about S.W. by W. from the cape there is a small shoal with $5\frac{1}{2}$ fathoms over it, named Peton de Socabo, which breaks in bad weather.

CAUTION.†—The coast between capes Ortegal and Finisterre is dangerous to approach at night, especially in the winter season, or in thick and foggy weather, which is frequent here, for not only does a powerful current at times set towards the land from the north-west, but the streams of flood and ebb often draw vessels out of their computed position. As some of the

* The Spanish Chart of 1835 places this rock nearer the point.

† H.M.S. *Crocodile* had fresh N.E. winds crossing bay of Biscay, and when off Cape Finisterre, experienced a current setting westward, which for six hours ran at the rate of 2·7 miles per hour. Captain Churchill attributes this current to the fact that the water which had been driven into the bay of Biscay by long continued S.W. winds, was escaping to the westward with the change of wind to the north-eastward.—Extract from a letter from Captain O. Churchill, dated 4th December 1890.

recorded wrecks in the neighbourhood of cape Finisterre may have arisen from the effects of the indraft, or set towards the land, as above described, the attention of mariners is again drawn to the necessity of caution and of a vigilant look-out when approaching the parallel of the cape. Mariners are also cautioned when approaching cape Finisterre, especially in vessels from ports of the United Kingdom, to lose no favourable opportunity of ascertaining the errors of the navigating compass—one of the unsuspected causes of vessels being found, in thick weather, in dangerous proximity to the land, being doubtless due to the disregard of these necessary observations.

The attention of mariners is called to Admiralty charts, No. 1,053 cape Peñas to Pontevedra bay, and No. 1,755, San Ciprian bay to cape Finisterre, comprising the north-west coast of Spain ; these charts contain the off-shore soundings obtained by H.M. surveying ship *Sylvia* in 1886, which now furnish a safe guide for the navigator in approaching this dangerous coast in thick weather, especially from the northward. Under such circumstances soundings should be obtained in due time. The 100 fathoms line of soundings passes just 10 miles off cape Finisterre. (*See also* pages 13–15, for Currents and Caution.)

LIGHT.—The lighthouse on the south point of cape Finisterre exhibits, at an elevation of 466 feet above high water, a *revolving white light*, which shows *alternate flashes and eclipses every thirty seconds*, and should be seen in clear weather from a distance of 20 miles. The light is reported to be irregular in its action and to appear as *fixed* within a distance of 10 miles, also as *fixed* at 15 miles, and *fixed and flashing* at 28 miles. Mariners are therefore cautioned that the light may not on all occasions answer to the description of a revolving light.

Fog signal.—During thick or foggy weather, a siren will give *every forty seconds*—two blasts, each of *three seconds* duration, separated by an interval of silence of *two seconds*, and followed by an interval of silence of *thirty-two seconds*.

The fog signal station, rectangular in shape, and white in colour, is situated 164 yards from the coast in a southerly direction, and 27 yards southward of the lighthouse.

Semaphore and Telegraph station.—The semaphore station established on cape Finisterre, painted white, and elevated 395 feet above the sea, is 44 yards northward of the lighthouse. Vessels should communicate by the International Code of Signals.

Coruña and Corcubion are in telegraphic communication with each other; in connexion with the semaphore station at Finisterre.

Life-saving apparatus.—There is a life-saving apparatus at the lighthouse.

The coast from cape Finisterre to the frontier of Portugal, on the river Miño, 64 miles to the southward, is much broken by a series of deep inlets and bays. The headlands are rugged and uneven, and as many dangers lie some distance off shore, the approach is dangerous at night or in thick weather. In the daytime, if the weather is clear, the coast may be seen 25 to 30 miles distant, the land near the shore being generally high, and some of the mountains not far inland attaining altitudes of 1,400 to 2,000 feet.*

CORCUBION BAY.—The deep bight immediately eastward of cape Finisterre, between the cape and Remedios point, is about 7 miles wide. From the cape the coast, which is high and precipitous, trends to the north-east for about $1\frac{1}{2}$ miles to the village of Finisterre, inhabited only by fishermen, on the shore of a small bay. The shore in front of the village and half a mile north of it is skirted with rocks, some of which lie 3 cables from the shore; then begins a low beach about a mile in length, named Lagosteira, and a long half mile beyond it is Sardiñeiro point, which is high and steep.

To the eastward of the village, off Lagosteira beach, there is good anchorage on sandy bottom, sheltered during northerly winds. It is much frequented by vessels in the summer, when north-easters are often of long continuance, but as soon as there are signs of the wind coming round to the S.E. or S.W. quarters, it is necessary to get under weigh, for all on-shore winds are dangerous. The inlet running in, one mile to the north-east, between Sardiñeiro point and cape Nasa, has a rocky patch lying in the middle of it, and is only used by fishing vessels. At its head there are two villages, one named Estordi, where there is a small rivulet, and the other, which is the westernmost, Sardiñeiro.

From cape Nasa, which is high and steep, a high level shore trends eastward $1\frac{1}{4}$ miles to cape Cé, the west entrance point to the bay of Corcubion, formed between the cape and Galera point, $1\frac{1}{4}$ miles to the south-east.

Cape Cé is a high bluff, with an octagonal granite light-tower annding 36 yards within its extremity. It should be given a berth of 3 or 4 cables, as it is bordered with rocks, and shoal water extends some distance off.

* See Admiralty chart:—Cape Finisterre to Vigo bay. No. 1,756; scale, $m = 0.5$ of an inch; and plan of Corcubion bay; scale. = 1 inch, on chart No. 1,755.

Galera point is low, with a number of large rocks near it ; but the bottom close to them is clean, and the water deep.

The shore trends easterly from Galera point, and then south and westerly to Piñeiro point at the foot of mont Pindo, 2,084 feet above the sea, forming Ezaro bay. In this little bay there is good depth of water, and at its head a flat shore with a small river, where water may be procured, which comes down through a gully, in the middle of high land. Piñeiro point is high, and on its south side is a small cove, and the fishing village of Pindo, at the termination of a valley. Three miles to the southward of Piñeiro point is Caldebarcos point, the coast between being high and skirted by rocks, and beyond it is the bay and beach of Carnota, and then follows Remedios point.

Caldebarcos point, bearing S.E. $\frac{1}{2}$ E., nearly $6\frac{1}{4}$ miles from cape Finisterre, is low and fronted by large rocks. A little north of the point is the village of Quilmas. Remedios point is salient, and surrounded by rocks, which extend $1\frac{1}{4}$ miles to the north-east. Near the point is a small conical hill, and a quarter of a mile farther eastward there is another of the same shape, but larger.

Corcubion bay, formed in the north-east part of the great bight thus described, runs in 2 miles to the northward from cape Cé, and affords good anchorage for all classes of vessels ; it is well sheltered from all winds but those from the southward, which send in a heavy sea. Its shores are high, with several small coves and patches of beach, two of which are near the head of the inlet. About half way in, are two forts ; that on the west shore is named Cardenal, and that on the east Principe. The distance across abreast the forts is about 6 cables, but the inlet narrows towards its head, where, on the west side, stands the town of Corcubion, and on the east side, called Fernelo, is a small river, and farther in on the same side is the town of Cé. The inhabitants of these places are principally employed in fishing, and rearing cattle.

About 200 vessels of all nationalities, representing an aggregate tonnage of 20,000, entered the port during the year 1886.

For vessels requiring repairs, there are a few caulkers, ship-carpenters, and blacksmiths. There are no special quarantine or Custom-house regulations, and no hospital or home for sailors.

There is communication to other ports by steam and telegraph.

There are no diseases at Corcubion against which special precautions are necessary.

Anchorage.—The usual anchorage is between the forts in about 11 fathoms water, sand, the depth gradually decreasing to within a

short distance of both shores. Vessels sometimes anchor farther in abreast the low beach of Fernelo, in 7 fathoms; but in winter the outer anchorage should be preferred, for should the wind come in from the southward, and blow hard, the vessel would tail near the shallows at the head of the inlet, and have no room to veer or let go an anchor, in case she should drive or part. The bay will accommodate six heavy ironclads, lying in from 13 to $7\frac{1}{2}$ fathoms water, at single anchor, with from 6 to 7 shackles of cable out.

DANGERS.—At two-thirds of a mile S. $\frac{1}{2}$ W. from cape Cé is a small rock, covered at high water, named the Carrumeiro chico. It has a rocky ledge extending 2 cables in a southerly direction, beyond which the water is deep across the channel, separating it from the Lobeira grande islet, nearly $1\frac{1}{2}$ miles to the south-west. At 2 cables from its north side there are 4 fathoms water, increasing to 6, and then shoaling to 3 fathoms on the edge of the bank of rock and gravel extending from cape Cé.

About a mile S.S.E. $\frac{1}{2}$ E. from the above rock is an islet or rock, named Carrumeiro viejo. It has large rocks on its east and south sides, with shallow water all round, but only to a short distance, for at one cable off, there are 11 fathoms, and soon after 17 and 22 fathoms.

Between Carrumeiro viejo islet and Lobeira grande the channel is $1\frac{1}{2}$ miles wide, clean and deep, and there is also a similar channel, about three-quarters of a mile wide, between the islet and Quilmas point on the south, where there is summer anchorage. It is necessary to give a berth to both sides of this latter channel, but in case of doubt, the safest plan is to pass nearer the islet than the shore, on account of the Asno shoal, which lies E. by N. $\frac{1}{4}$ N. half a mile from the islet, with the south extreme of the islet and Lobeira grande in line, and Galera point on with the low shore of Fernelo. Large vessels, if requisite, may pass between this shoal and the land.

Los Bois de Gures, about $3\frac{1}{2}$ cables southward of Galera point, are three large rocks, forming a triangle, and resembling three fishing boats lying together. They are clean, and have deep water on all sides except the west, from which a rocky ledge projects more than a cable, and at its extreme the depth is $2\frac{3}{4}$ fathoms. Vessels may pass on either side of the rocks, and the passage between them and Asno shoal carries 9 to 13 fathoms, but it is narrow.

Lobeira Grande is an islet composed of reddish coloured boulders and rocks, lying N.N.W. and S.S.E. From its centre cape Finisterre bears W.N.W. $3\frac{1}{4}$ miles, and cape Cé N.N.E. $\frac{1}{2}$ E., nearly

2½ miles. It is foul all round to the distance of from 1 to 2 cables, and 2½ cables from the south end lies Camariñas rock, with 3½ fathoms over it at low water.

Lobeira Chica, about three-quarters of a mile S. by E. from the Lobeira grande, with a clear passage between of 7 to 24 fathoms water, is another cluster of rocks, but smaller than Lobeira Grande, and intersected by numerous channels, through which fishing boats pass at high water. It is low, and in a swell the sea washes over it; shoals surround it in all directions, and 2 cables off its west side is a small rock, called Peton de Potes, which dries at low water.

There is foul ground between Lobeira Chica and Caldebarcos point, to the south-east, and 2 cables off Fero point is Peton de Fero, a small rock on which the sea breaks.

Duyo rock is a dangerous patch, with 2½ fathoms water over it, lying a long 4 miles S.S.E. from cape Finisterre, in a direct line between that cape and Remedios point. It is of small extent, with deep water close to, except on its eastern side, where there are depths of 4½ and 5½ fathoms.

Nearly a mile westward of Remedios point are some large rocks, always above water, surrounded with shoals, named Miñarzos. The passage between these rocks and the ledge bordering the point is used only by coasters. At the distance of about 1½ miles, and between the bearings of N. ½ W. and N.N.E. from the point, are other dangerous shoals, called Arrosas and Arrosiñas; and Remedios point may be considered as foul in all directions to the distance of from one to 1½ miles.

Coal.—A coal dépôt named the Cape Finisterre Coal Dépôt Co., has recently been established at Corcubion. About 8,000 tons of Welsh coal are kept in stock; coaling is by lighters, and is not interrupted during bad weather. Price about 28s. per ton, inclusive.

Telegraph station.—Corcubion is in telegraphic communication with Coruña; in connexion with the semaphore station at Finisterre.

Life-saving apparatus.—There is a rocket apparatus at Corcubion.

LIGHT.—The octagonal granite light-tower on cape Cé, the west point of entrance to Corcubion bay, exhibits, at an elevation of 82 feet above high water, a *fixed red* light, visible from a distance of 8 miles.

Pilots for Corcubion bay reside at the village of Finisterre, and come off to vessels requiring their services, the usual signal being hoisted.

Tides.—It is high water, full and change, at cape Finisterre, at 3h.

Directions.—Bound into Corcubion bay, with a leading wind from south-east or south-west, steer towards the Lobeira grande, passing it on either side, and then between the Corrumeiro chico and Corrumeiro viejo for the entrance. The best leading mark in, is a conspicuous waterfall pouring down a mountain gorge, which will be seen bearing E. $\frac{1}{2}$ N. on getting abreast cape Finisterre. It falls over the spur lying between mount Ezaro and mount Pindo, and when in line with the northernmost of two white houses on the beach in Ezaro bay will lead between the Corrumeiro chico and the Lobiera grande. When cape Cé bears N. $\frac{1}{2}$ W. steer for the anchorage, which will now be visible. Give the Corrumeiro chico a berth of two cables, and proceed up the harbour, anchoring as convenient.

With a north-west wind it will be advisable to run between cape Cé and the Corrumeiro chico, keeping nearer the latter than the cape. Haul to the wind directly the shoal ground off the cape is passed, anchoring where the vessel can fetch, or, if the tide be flowing, work to the anchorage off the forts.

If unable to work into the bay with a north-east wind (as generally happens during the north-easters of summer), anchor either at the entrance or off Lagosteira beach, or on the east shore with Corrumeiro viejo bearing about N.N.W., and Lobeira grande W. $\frac{1}{4}$ S.; this latter is a good berth, and much used by coasters.

The coast* from Remedios point trends, in a southerly direction, 5 miles to Queijal point, which forms the north-west point of entrance to Muros, or Noya, bay. The land between is high in the interior, but the shore low, and bordered, as far as Lens point, by rocks which extend some distance off. Lens point is also low, and fronted by a ledge, and there are sunken rocks off it, on which the sea breaks at low water. The bay on its north with a sandy beach is named Lariño.

Area Mayor, the bay between Lens point and Queijal point has a flat clean shore, which extends across to Muros bay, separating monte Louro from the other hills on the north, so that at a distance it appears like an island. Monte Louro is a round hill 787 feet high, with two peaks, the higher of which, the southern, is crowned by a watch-tower. On Queijal point, its south extreme, stands an hexagonal light coloured granite light-tower, 24 feet high, with the keeper's dwelling adjoining it.

* See Admiralty chart :—Cape Finisterre to Vigo bay, No. 1,756; scale, $m = 0.5$ of an inch.

About 5 miles N.W. $\frac{3}{4}$ W. from the above lighthouse is a circular shoal, named the Meixidos, consisting of several dangerous sunken rocks, on one of which there are only 3 feet water, but their position is nearly always pointed out by breakers. A patch of $3\frac{3}{4}$ fathoms, called the Yusua rock, lies half a mile from the west side of the shoal, and there is another of the same depth about the same distance from the north side. The channel between the Meixidos and the land is deep and clear of danger, but it will be more prudent to pass outside, which may be done by keeping the Navé of Finisterre open of the north-west extreme of cape Finisterre, bearing N. $\frac{1}{4}$ E., until the lighthouse on Queijal point bears S.E. by E. $\frac{1}{2}$ E., when a vessel will be south of these dangers.

Nearly 3 miles W. by N. $\frac{1}{4}$ N. from the tower on monte Louro, are some large rocks named the Bruyos, which are low, and in a heavy sea the water washes over them. A sunken ledge extends some distance from their west side, and about three-quarters of a mile northward of them, lies another rocky patch named the Mean.

The Leixon rocks, off Queijal point at the foot of monte Louro, are large and clear on all sides except the north; the channel between them and the land is deep but narrow.

LIGHT.—The light-tower on Queijal point, on the north side of the entrance to Muros bay, exhibits, at an elevation of 88 feet above high water, a *fixed white* light, visible in clear weather from a distance of 10 miles.

MUROS, or NOYA, BAY.—This bight, running in E.N.E. between Queijal point and Castro point, $3\frac{3}{4}$ miles to the S. by E. $\frac{1}{2}$ E., has on its north shore the port of Muros, and at its head on the south the inlet of Noya, which may be navigated by small vessels as far as the town of Noya, but a pilot is requisite as there are several shallows. The whole bay is almost surrounded with high land, but it is open to the south-west, and there are many sunken dangers off its rocky shores.

Depth of water.—The general depths in Muros bay are from 12 to 24 fathoms over clean ground, and there is anchorage off the town in 8 to 10 fathoms mud.

Francisco bay, the first bight on the north shore between Queijal point and Bouja point, has a beach, but there are many rocks both above and below water close to it. The depths are convenient at a short distance offshore, but no vessel should anchor here as the bottom is foul. Bouja point is high and precipitous, with a reef running some distance from it to the southward, having on its extremity, which is steep-to, only 6 feet water.

About a mile north-east of Bouja point is the Atalaya de Muros, a hill 770 feet high, perpendicular over the sea, with deep water close to ; from thence the shore bends round to the north-west and north, forming port Muros, the head of which is shallow. Half a mile within the Atalaya is a beach and the little town of Muros, which possesses a few coasting vessels and fishing boats.

Bornalle bay, 2 miles north-east of the Atalaya, has a beach and rivulet at its head ; from thence a rocky coast runs southward three-quarters of a mile to an islet surrounded with rocks, which must be given a wide berth. From this islet to a point, $1\frac{1}{2}$ miles eastward, the coast is of moderate height, with a number of large rocks and shoals extending off it in places about a third of a mile. Then follows a bight with sandy beaches, and at its head is the Esteiro rivulet. Huia point is low and foul, but the land rises behind it ; Quiebra island, lying off it, is high, with rocks extending from its north-west and south-east ends ; the passage between it and the point being only fit for boats.

Noya inlet, between Quiebra island and Plancha point on the opposite shore, should not be entered by a stranger without a pilot, as there are rocks and shallow water within. The town of Noya stands on the southern shore of an inlet, and the rivers Sierra and Tambre run into the sea on the north. Plancha point is high and projects but little, with four fathoms water near it. Cabeiro point, $2\frac{1}{2}$ miles westward, is also high, broad, and on its west side is the beach of Polveira, which terminates in a low point nearly half a mile westward, from which a reef extends half a mile to the north-west, and at low water a large rock, Filgueira, appears in the middle of it.

Between the low point and the Atalaya de Son, the next point westward the shore is a beach with several rocks off it, some of which are visible at low water. The Atalaya de Son is a hill of moderate height, dark coloured and precipitous, with a chapel on its summit. Close to its east side is the town of Son with a small mole. The shore hence to Castro point, $2\frac{1}{2}$ miles to the south-west, is skirted by rocks. Castro point is of moderate height, perpendicular, dark coloured, and foul ; and N.W. by W. $\frac{1}{2}$ W. $1\frac{1}{4}$ miles from the point, and South $2\frac{2}{3}$ miles from the light-tower on Queijal point, is the middle of a reef called the Baya, nearly awash at low water. Nearly midway between it and the point is a rock called the Con, between which and the ledge off the point is a narrow channel with 13 fathoms water, used only by coasters.

Depth of water.—Noya inlet has 9 fathoms of water at the entrance, but there are rocks and shallow water within.

Las Basofias.—This extensive rocky bank may be mentioned here as it is in the track of vessels approaching Muros bay from the southward. The largest rock on the bank is like a sloop's hull, having other smaller rocks round it; the lighthouse on Queijal point bears from it N.N.E. $\frac{1}{4}$ E. $5\frac{1}{2}$ miles, and Castro point N.E. by E. $\frac{1}{2}$ E. about 4 miles. The bank extends westward from the rock about 2 cables to a rock which dries at low water; here the bank turns to the northward. There are 7 fathoms water close to on its east side, and 14 fathoms on its west side.

Pilots for Muros bay are to be obtained by hoisting the usual signal flag.

Directions.—The position of Muros bay may be easily recognized from seaward by monte Louro, which being isolated from the hills at its back will appear like an island; or if this hill is not seen it will be known by cape Finisterre and monte Ezaro or Lezaro to the northward of the bay, and the peak of Curota to the southward. This peak is the highest land on this part of the coast. It is broad, and from the summit down, a fourth of its height appears to be cut perpendicularly on the side facing the west, but afterwards sloping gradually.

Entering the bay with a northerly wind, keep the northern shore aboard, giving a berth to the Leixon rocks off Queijal point, and to the reef extending from Bouja point. From thence, a board or two will reach the anchorage abreast the town of Muros, in 8 or 10 fathoms water, mud. The easterly winds, although off the land, raise a heavy sea, and have occasioned the loss of many vessels.

If the wind be from the South or S.E. keep the southern shore aboard, avoiding the Basonas, and pass outside the Baya reef, by keeping the lighthouse on Queijal point eastward of N. by E. until Cabeiro point bears E. $\frac{1}{4}$ N. Castro point will not at first be easily made out, as it lies at the foot of high land.

The coast from Castro point, on the south side of entrance to Muros bay, trends S.W. $\frac{1}{2}$ S., $7\frac{1}{2}$ miles to cape Corrobedo, and is backed, at a short distance inland, by the lofty range of the Sierra de Barbanza, with the remarkable Fenegueira and Curota peaks at its extremities; Fenegueira peak, at the northern extreme, is elevated 2,267 feet, and Curota peak, near the southern, 2,070 feet above the level of the sea. Between Castro point and Roncadora point, the

next projection to the southward, the shore is low with rocks and shoals off it. Roncadora point, which is high and steep, like Castro point, is foul.

Southward of Roncadora point the shore is low as far as Careisiñas point, which is bordered with rocks. Estallans point, $1\frac{1}{2}$ miles farther south-west, is also low and rocky, with a reef extending from it to the northward about a third of a mile; there is also a rock called Teilan, about half a mile from the point in a W. by N. direction, being separated by a depth of 9 fathoms. Between Careisiñas and Estallans points, there is a hill of moderate height, 785 feet, called monte Taume, which slopes towards the south-west, and terminates in another hill, neither so high nor so sharp pointed as the former, called monte Facho.

Cape Corrobedo, nearly $1\frac{1}{4}$ miles south-west of Estallans point, is low, salient, and surrounded by rocks, but it will be easily recognized by its lighthouse. Between the Cape and Angueiro point, $3\frac{1}{2}$ miles southward, is a large bay, with a flat beach, skirted here and there with large rocks. The village of Corrobedo is situated in the northern angle of the bay, nearly a mile east of cape Corrobedo. As far as the beach the shore is high and rocky, and beyond the beach to Angueiro point it is again of moderate height and steep, but of a sandy colour.

This bay has anchorage in 11 fathoms water, sand, occasionally used by coasters in off-shore winds, but off its entrance are dangerous ledges, steep-to, on which the sea breaks when there is any swell; the outermost ledge, named Pragriña, lies S.W. $\frac{1}{4}$ W. $2\frac{1}{2}$ miles from cape Corrobedo, and between are four others named Cobos, Tomasa, Rinchador, and Marosa. About $2\frac{1}{2}$ miles S.S.E. from the Pragriña is the Canteiro, the outer of three other ledges lying nearly 2 miles westward of Angueiro point. This point has off it some islets and rocks, which, with the large rocks off the north-east part of Salvora island, resemble from a distance a number of vessels under sail.

Lifeboat.—There is a lifeboat at Corrobedo.

Salvora island, $2\frac{1}{2}$ miles southward of Angueiro point, is about one mile in length, N.N.E. and S.S.W., of a reddish colour, and high in the middle, but low at each end, particularly the north. A number of rocks and foul ground, called the Asadoiros bank, extends nearly one mile in a northerly direction from its north end, and to the eastward of this bank, and lying nearly parallel with it, is a chain of large rocks and islets, the highest islet called Noro, being

129 feet above the sea. On the eastern side of Salvora there is a rock 3 feet above high water, with shoal water round it, lying N. $\frac{3}{4}$ E., $2\frac{1}{2}$ cables from Fuente point, and nearly one cable from the shore. There is also a small rock, near the anchorage ground on the eastern side of the island called Tangonas, with $2\frac{3}{4}$ fathoms over it, lying S.E. by S., $1\frac{1}{4}$ cables from Area de Bois point; this rock must be carefully avoided when anchoring here. A lighthouse stands on the south end of the island, off which, at the distance of $1\frac{1}{2}$ cables, there is a rock which seldom uncovers, but with breakers around it. The anchorage here is good, for one or two ships, but cannot be recommended for a fleet until better surveyed.

LIGHTS.—The lighthouse on cape Corrobedo exhibits, at an elevation of 106 feet above high water, a *fixed white* light, visible in clear weather from a distance of 15 miles.

Salvora island.—The lighthouse, on the south end of Salvora island, exhibits a *fixed white* light varied every *two minutes* by a *red flash*. It is elevated 82 feet above high water, and visible in clear weather 12 miles.

AROSA BAY extends about 13 miles in an E.N.E. direction, with a varying breadth of from 2 to 7 miles, having its entrance between Salvora island on the north, and Grove peninsula on the south. The island of Arosa and numerous small islets and rocks are scattered about within it, and there are many reefs off the points and islands, but the navigable channels leading to the principal anchorages are sufficiently clear to enable the prudent mariner with a good chart, and a leading wind and daylight, to take his vessel safely in. This bay may, therefore, be resorted to in case of emergency, as there are many good and well sheltered anchorages within it.*

The entrance is 2 miles wide, with 32 to 34 fathoms water, mud bottom, which depths continue about 6 miles to the north-east. Brisans point, the east extreme of Salvora, has some rocks off it which are above water. The north-west extreme of the Grove peninsula is low and rocky, with large rocks fronting it; the southern part of the peninsula is connected to the main by a narrow neck of sand.

The towns of Villagarcia and Carril being connected with the capital of the province, the historic town of Santiago de Compostella, by a railway, the bay of Arosa is becoming of some importance.

* See Admiralty chart :—Arosa and Pontevedra bays, No. 1,758; scale, $m=1.38$ inches.

Con de Baixeu rock, on the west side of Arosa bay, with a depth of 7 feet water over it and 7 fathoms close round, lies about $1\frac{1}{2}$ cables south of Sinal del Maño shoal, which is a dangerous shoal awash at low water, with $2\frac{3}{4}$ fathoms all round it; from this rock Arosa island lighthouse bears E. by S. $\frac{1}{4}$ S., and Rua island lighthouse S.W.

Mascatino rock, with 4 feet water and $5\frac{1}{2}$ fathoms close round it, is surrounded by seaweed nearly awash at low water; it lies about midway between Sinal del Maño shoal and Cabio point; from the rock Arosa island lighthouse bears S.E. by E., and Rua island lighthouse S.W. by S.*

Bajo Ter, a sunken rock with 10 feet water, lies about a third of a mile from Barbafeita point, the north-west point of Arosa island, and is apparently the end of a continuous reef extending from the point. Vigia de Ancados, bearing N.E. by E., leads $4\frac{1}{2}$ cables north-westward of this rock.

La Barsa, a conical rock which uncovers about 3 feet at low water, and has deep water close to, lies $3\frac{1}{2}$ cables south of Chazo point.

Las Novias, Bajo Seijo, and Las Hermanas, form a rocky patch, nearly one mile N.W. by W. $\frac{1}{2}$ W. from Sines point; Las Novias shows about 4 feet at high water, but the other two rocks are covered at high water and show about 4 feet at low water. There are 7 to 8 fathoms, $1\frac{1}{2}$ cables to the north-east and east of them.

Mount Giabre kept E. $\frac{1}{4}$ S., and steered for on that bearing, will lead between Bajo Seijo and La Barsa, or should mount Giabre be obscured by clouds, the island of Benencia, kept well to the northward of the first rise in the mountain range to the N.W. (behind Puebla), will also lead clear of them. Great Malvira island in line with the northern peak of Giabre clears La Barsa and Chazo point shoal.

Anchorage.—There is a fine weather anchorage in 10 to 15 fathoms water, on the north-east side of Salvora, with Brisans point bearing about S. by W. $\frac{1}{2}$ W., distant two-thirds of a mile, but take care to avoid Tangonas rock and the other dangers referred to on page 313. Vessels may anchor in summer with easterly winds in 8 to 12 fathoms in the bay on the south side of Grove peninsula, giving a wide berth to the Corzan and Aguiera rocks on which the sea generally breaks.

* A sunken rock lying E. by S. $\frac{1}{4}$ S., 7 cables from Cabio point, was unsuccessfully searched for by H.M.S. *Iron Duke* in 1889. It may nevertheless exist.

The principal anchorages on the north-western side of the inlet are in the bays of Santa Eugenia and Puebla; the former cannot be recommended, as it is open to the southward.

Small vessels will find good shelter in the northern corner of the inlet, about a mile off the mouth of the river Meluzo, in 2 fathoms, mud bottom.

In the eastern corner of the inlet are the town and bay of Carril, the town of Villagarcia, and several villages scattered along the south-east coast; Carril bay affords a roomy and well sheltered anchorage in 7 to 9 fathoms. H.M.S. *Agincourt* (with Channel Fleet), 1874, anchored in 7 fathoms, with Sines point bearing S.W. by W. $\frac{1}{4}$ W., and Ferrazo point S.E. by E. $\frac{3}{4}$ E.

There is a mole, or pier, at Carril, and another at Villagarcia, where small craft may lie alongside, but a rock with 2 feet over it, at low water, lying 55 yards in a south-westerly direction from the mole head at Carril must be avoided.

There is anchorage off the north end of Arosa island, abreast the village of Arosa, in 8 to 11 fathoms; this is considered a good winter anchorage, and with a southerly wind is preferable to Puebla bay.

Anchorage will also be found off the west side of the island in 14 fathoms, with Pedregosa isle bearing W. by S., distant about a mile.

LIGHTS.—On Caballo point, the north extreme of Arosa island, is a lighthouse, which exhibits, at an elevation of 36 feet above high water, a *fixed white* light, visible in clear weather from a distance of 10 miles.*

Rua island.—On Rua island is a round gray coloured granite tower, which exhibits, at an elevation of 84 feet above high water, a *fixed white* light; visible in clear weather from a distance of 11 miles. The tower is attached to the keeper's dwelling.

Pilots for Arosa bay are generally found at Salvora island. Vessels requiring their services must fire a gun, in addition to hoisting the usual signal flag.

Tides.—It is high water, full and change, at Salvora island, at 3h. 18m.; springs rise 11 feet, neaps $7\frac{1}{2}$ feet. The flood runs 5 hours and the ebb 7 hours.

* The provisional light which is exhibited at Villagarcia is a *fixed red* light, elevated 24 feet above high water, and should be visible in clear weather from a distance of 3 miles. The light is shown from a wooden support, painted white, and situated on the extremity of the mole, which extends 460 yards from the shore.

Directions.—If bound to any of the anchorages in Arosa bay from the westward or north-westward in fine weather, Salvora island, which is of moderate height and rocky, will be soon recognized. The lighthouse is not easily discernible from seaward, being very low and of the same colour as the rock on which it is built.

During the fishing season—April to December—care must be taken to avoid the nets of the innumerable fishing boats belonging to the district. The regulations of the port which compel them to leave a clear space in the fairway leading up to Rua island are generally disregarded.

After passing Salvora island, at a convenient distance, steer into the bay with the hill next west of Cabio point in line with Rua island bearing N.E. $\frac{1}{2}$ N., pass Rua island at a distance of $1\frac{1}{2}$ or 2 cables, and continue to the northward until the Vigia de Ancados is seen open of Benencia island, N.E. by E., which will lead nearly midway between Con de Baixeiro rock and Bajo Ter; if bound for the anchorage in Carril bay, bring mount Giabre to bear E. $\frac{1}{4}$ S., and steer for it, which will lead between La Barsa and Bajo Seijo, anchoring as convenient in 7 to 9 fathoms water.

ONS ISLAND, lying 5 miles southward of the entrance of Arosa bay, is nearly 3 miles long, N.E. $\frac{1}{2}$ N. and S.W. $\frac{1}{2}$ S., with a general breadth of about half a mile, and affords some shelter from north-west gales to Pontevedra bay, the next inlet to the southward. The island is of moderate height, and level on the top, but its western side is rugged and bordered with rocks. Its eastern side is cleaner, and has two spots of beach where boats may land; there is anchorage about a third of a mile off this side in 13 fathoms water, sand, shells, and mud; within this distance the bottom is rock.

Fagilda bank.—The north end of Ons is separated from the coast by a passage 2 miles wide, but there are several dangerous rocky patches in it, and the Fagilda bank, a rocky ledge, extends half a mile from Fagilda, or Magor, point, a little southward of Corbeiro point.

Camucos rocks, situated about 4 cables eastward of the north-east point of Ons island, consist of three rocks in a north-west and south-east direction distant from each other about one cable. The central rock dries about one foot at the lowest spring tides: the northern and southern rocks are covered respectively about 3 feet and 16 feet at low water spring tides. There are 6 to 9 fathoms water, rocky bottom, in the channels between these dangers, and vessels locally acquainted run through in fine weather, but they should on no account be attempted by a stranger as none of

the shoals are marked when there is much swell the sea breaks all over them.

Onza is a small round island separated from the south point of Ons by a passage about 3 cables wide, which is only used by fishing vessels, as there are several rocks in it, and a shoal with but little water over it lies nearly in mid-channel. The island is 360 feet in height, and has a beach on its northern side; but all the other sides are bordered with rocks.

Menguella bank.—Galera point, its south extreme, is found some distance off, and W.S.W. $1\frac{1}{4}$ miles from the point is the Menguella bank, with 9 fathoms water, where the sea sometimes breaks in bad weather.

Pan de Centeno, on which the steam-vessel *Vizcaya* grounded, is a small black rock having a depth of $2\frac{1}{2}$ fathoms, with from $6\frac{1}{2}$ to 7 fathoms water close round it, increasing gradually to 13 fathoms. The rock lies 8 cables westward of Galera point, and from the rock cape Udra is just open of the point bearing S. 67° E.; the lighthouse on Salvora island, bears N. 2° W.; and the lighthouse on Faro island, Cies islands, S. 8° W.

Montesecco bank.—Nearly midway between Menguella bank, and Pan de Centeno rock, is another shoal spot, called Montesecco bank, with $4\frac{1}{2}$ fathoms over it at low water.

The coast.—Fagilda, or Magor, point is of moderate height, and perpendicular, with some large rocks fronting it, thence a level coast trends S.S.E. $2\frac{1}{2}$ miles to Cabcastro point; midway is monte Montalvo, which is higher than the rest of the coast, and has on either side of its point a small beach. Cabcastro point is steep, and forms with cape Udra, $2\frac{1}{2}$ miles to the S.S.W., the points of entrance to the inlet of Pontevedra, which runs 8 miles to the eastward.

LIGHT.—On the most elevated part of Ons island, and $1\frac{1}{4}$ miles from its north point, is a tower which exhibits, at an elevation of 421 feet above the level of the sea, a *fixed white* light, varied by a *flash* every *two minutes*, and visible in clear weather from a distance of 12 miles.

PONTEVEDRA BAY is easy of access, but large vessels should not enter it in the winter season on account of the little shelter it affords; in summer, however, it furnishes good anchorage.

The land on both shores of the bay is high, but broken into many pleasant and well-cultivated valleys. Porto-novo point, on the northern shore, three-quarters of a mile eastward of Cabcastro point, is high, with a large rock and some sunken ones off it. Vessels

bound northward, with northerly winds, generally anchor abreast the flat shore, between these points, in 8 to 10 fathoms water. On the east side of Porto-novo point is the bay and fishing village of the same name. From thence the shore continues eastward three-quarters of a mile to another village, named San Genjo; in the interval are some spots of beach separated by rocky points, with shallow water off them.

Dangers.—To the south-east of San Genjo is a rocky point, and nearly a mile farther on is Fertiñanzo point. This point is rocky and low, with detached shoal spots extending three-quarters of a mile from it to the south-west; two-thirds of a mile to the eastward are a cluster of large rocks, named the Bueyes (or Bulls) de Rajo, which are covered at high water. From thence to Marinulos point, $2\frac{1}{2}$ miles farther eastward, are several small points, with spots of beach. A rocky patch lies off Oriciera point, and a large rock off the south-west side of Chancelas point; the rest of the coast is clear; but give the points a berth of 2 cables, as the ground off them is generally shallow.

Depth of water.—The soundings in Pontevedra bay are 23 to 5 fathoms, mud and sand, except in the neighbourhood of cape Udra, the south point of entrance, where the bottom is of rock and gravel; and on the northern shore of the bay, about Fertiñanzo point, where it is of rock.

Tamba island, 270 feet high, lying half a mile south of Chancelas point, is round, with rugged shores, excepting on the east side, where there is a small beach. Its shores are clear of danger; but between its northern extreme and Chancelas point the water is very shallow.

To the north-eastward, between Chancelas point and the entrance of the river Leres, is a shallow bay, parts of which dry at low-water springs, named Combarro from a town of that name at its head.

The river Leres between the points of entrance is three-quarters of a mile wide, but the whole space, as well as the river itself, dries at low water, so that even coasters must wait for a flowing tide to take them to Pontevedra. The low sandy point of Placeres, the south point of entrance, has a chapel on it; and between it and Pesquera point, $1\frac{1}{2}$ miles westward, is a bight with a flat shore, in the midst of which stands the town of Estrivela; and farther on, near Pesquera point, the town of Marin, and a small river used by fishing craft, which ground in it at low water.

Pontevedra* is situated on the south bank of the river Leres, about 2 miles within the entrance ; it is well built and surrounded by walls ; a long bridge of 12 arches here spans the river, up to which small craft can come at flood tide.

The chief exports are flour, sardines, and pines ; and the chief imports are coal, timber, sugar, brandy, &c. In 1886, 176 vessels, of all nationalities, entered the port, representing an aggregate tonnage of 33,222 tons.

There are no special Custom-house or quarantine regulations ; the regulations in force apply to all ports on the coast of Spain.

There is steam communication with other ports, and railway communication to all important towns ; and there is a telegraph station here.

There are no diseases against which special precautions are necessary. There is a hospital at Pontevedra.

Harbour works are in progress, the chief being the prolongation of the wharf, and a line of rail connecting it with the station in the town. Population in 1882 was 10,000.

Pesquera point is high and rocky, with a look-out on its summit, and a battery about one-third of the way up.

From thence the coast, which trends W.S.W. $2\frac{1}{4}$ miles to Loira point, has several spots of beach separated by points, off some of which are large rocks, and a shoal spot of $2\frac{3}{4}$ fathoms lying 2 cables off Aguste point ; but the water is deep and the ground clean half a cable outside these dangers. Loira point is easily recognized, being the foot of mount Loira, 414 feet above the sea.

Between Loira point and cape Udra is a deep bay, $4\frac{1}{2}$ miles wide, with general depths of 7 to 16 fathoms. San Clemente point, the first projection southward of Loira point, is rocky and uneven, with several rocks fronting it, and appears at a distance like an island, from the flat shore on either side and the low ground behind it.

Monte-gordo point, three-quarters of a mile farther on, is less projecting, but higher than that of San Clemente ; and here begins a low shore, which terminates nearly $1\frac{1}{4}$ miles westward, near Piedras Blancas point, off which there are a number of rocks, and Caballo islet, which lies $2\frac{1}{2}$ cables north of it.

Thence the coast continues steep, with the exception of two small patches of beach, called the Mourisca sands, as far as Mourisca point, off which there is a small patch of $2\frac{1}{4}$ fathoms ; from this shoal the

* Revised from information furnished by H.B.M. Vice-Consul, June 1887.
SO 10809.

point bears W.S.W., $5\frac{1}{2}$ cables; and midway between them is the Lobeiras bank. Condepego point, $3\frac{1}{2}$ cables, from Mourisca point, is the next point to the westward, from which a ledge extends a quarter of a mile to the north-east. This point and cape Udra form a broad rocky front, having many large rocks off it, some of which are covered at high water, when the sea breaks over them. The cape is low at its extreme, but rises into a rocky hill, beyond which the interior of the country is high land.

Pilots.—The fishermen of Pontevedra are competent to act as pilots for the various anchorages.

Directions.—Pontevedra bay may be easily known when approaching it from the westward, during the day, by monte Curato and the islands Salvora, Ons, and Onza, to the northward of the entrance, and the Bayona islands to the southward; and at night by the respective lights. In entering give a wide berth to the shoals off the south end of Onza, and to the ledge surrounding cape Udra. Having arrived between this cape and Cabicastro point, the course is E.S.E., until Tamba island bears E. by N. $\frac{1}{2}$ N., when steer for it.

Anchorage.—As before stated, no large vessel should seek for anchorage in this bay in winter. Small vessels moor in 3 to 4 fathoms, gravel, abreast the town of Marin, and are sheltered from all winds; but a sea sets in with westerly gales. There is better shelter from these gales, in 3 fathoms, on the east side of Tamba, with a cable made fast to the island. Large vessels should not go farther in than 7 to 8 fathoms, mud, between Tamba and the town of Marin; but here they will be exposed to the west.

ALDAN BAY (Ensenada de Aldan), formed between cape Udra and Couso point, $1\frac{9}{10}$ miles to the south-west, will accommodate vessels of the largest draught; but it is exposed to north-west winds, which bring in some swell, although the islands of Ons and Onza in some measure cover its entrance. The bay is nearly 3 miles deep in a southerly direction, gradually narrowing to its head, where there is a small bend to the eastward, but so shallow as only to admit coasters and fishing craft, which lie safe in all weathers. At the head of this bend is the town of Aldan, where there is a stream of excellent water.*

The coasts of the bay are steep, with patches of beach, and fronted with rocks and shoals which must be avoided. From cape Udra the eastern coast trends S. $\frac{1}{2}$ W. 3 miles to Piedra Rubia point; thence to Con point, nearly half a mile farther south, the coast is lower but

* See Admiralty plan:—Vigo bay. No. 2543; scale, $m = 1\frac{1}{2}$ inches.

steep and clean. About 3 cables W.S.W. of Con point is another point, with a large rock off it, (and here ends the low shore at the head of the bay,) between which and the Bouteye shoal with 6 feet water over it, lying $3\frac{1}{2}$ cables to the northward off Ria point, is the best anchorage for small vessels.

Ria point is marked by a beacon.

Depth of Water.—Aldan bay will accommodate vessels of the largest draught.

Dangers.—Area Brava point, about half way in on the western shore, is of moderate height, and surrounded with rocks to the distance of $1\frac{1}{2}$ cables. A beacon stands on the point, and another on the edge of the rocks which extend from it. About 3 cables N.E. by E. from the point is a patch with 4 feet water over it, and there is another with 7 feet, named the Bajo Dado Con, lying 4 cables S.E. by E. $\frac{1}{2}$ E. from Couso point which is marked by a buoy. Couso point is also of moderate height and steep, with a shoal lying N.N.E. $2\frac{1}{2}$ cables from it; the least water on the shoal is $3\frac{3}{4}$ fathoms; there are 13 fathoms outside it, and 11 fathoms between it and the point, and its extremity is marked by a red and white chequered buoy. Another shoal of larger extent fronts the coast between this point and Osas point, a quarter of a mile W. by S.; it extends about half a mile from the land, and on it are several large rocks, named the Osas islets, always above water.

Directions.—Aldan bay should be navigated with a leading wind, on account of the rocks and shoals fronting its shores. In entering give a good berth to the shoals off cape Udra and Couso point, then keep in mid-channel, steering south for Con point, and passing eastward of the shoals on the western shore.

Anchorage.—There is good anchorage for large vessels above Area Brava point in 10 to 11 fathoms, mud bottom. The best berth for small vessels is southward of the Bouteye shoal, over sandy bottom, about 2 cables off the Playa de Arneles.

CIES or BAYONA ISLANDS.—The coast from Couso point trends S.S.W. $\frac{3}{4}$ W. $3\frac{1}{2}$ miles to cape del Home, the west extreme of a promontory forming the north point of entrance of Vigo bay, and is all the way high and steep. This cape and Subrido point, about half a mile to the south-east, are both moderately high, and bordered with reefs.

Nearly 2 miles W. by N. $\frac{1}{2}$ N. of the cape is Caballo point, the north extreme of the Cies or Bayona islands, lying north and south, and covering an extent of 4 miles in front of the entrance

of Vigo bay, to which they form a natural landmark and breakwater. They are high and uneven on the summit, steep on the west side, but less so on the east, where there are some sandy beaches, and they are easily recognised from their rugged contour, which is unlike anything else along this coast.

A lighthouse stands on the summit of monte Faro, being the highest land, at the south-west end of the northern island.

The northern island is nearly $2\frac{1}{2}$ miles long, but at two-thirds of its length from Caballo point, its north extreme, it seems from a distance to be divided into two parts; this is not, however, the case, for these two parts are connected by a low narrow neck of sand, over which the sea sometimes washes in a heavy swell.

Dangers.—At a quarter of a mile N.W. $\frac{1}{2}$ N. from Caballo point is a rocky shoal of some extent, named Roncosa, which dries at low tide, leaving between it and the point a channel with 7 fathoms water; and N. by W. $\frac{1}{2}$ W., nearly $1\frac{1}{2}$ miles from the same point is another shoal with $2\frac{1}{2}$ fathoms water over it, named Biduido, which is about the size of a launch, with depths of 5 to 12 fathoms and sunken rocks between it and Roncosa, and steep-to on the north side.

The two islands are separated by a pass, over a quarter of a mile wide, named Freo de la Porta, with $4\frac{1}{2}$ fathoms least water. Both shores of the pass are lofty and steep, but a rocky ledge extends one cable from the north end of the south island, and another one 3 cables from the south-west end of the north island, and all along the west sides of both islands are rocky ledges, which extend some distance from the shore.

St. Martin island, the southern island, is about $1\frac{1}{4}$ miles long and at 4 cables W. by S. $\frac{1}{2}$ S. from its south-west point is a small rock, named Forcado, which dries 4 feet at low water.

Boeiro rocks.—The islets or rocks named Boeiro, 70 feet high, lie W. by S. $\frac{3}{4}$ S. one mile from cape Vicos, the south point of the island.

Los Castros de Agoeiro.—There is also at three-quarters of a mile S.W. $\frac{1}{2}$ S. of the Boeiro a dangerous small pinnacle rock with 3 fathoms water over it, named los Castros de Agoeiro, with 6 to 12 fathoms close round it, which only shows in a very heavy sea, and rarely breaks, forms a great danger to ships entering Vigo bay by the south pass.

$2\frac{1}{2}$ cables S. by W. $\frac{1}{4}$ W. from cape Vicos lies a rock which is awash at half ebb. There are passages between the dangers which, with a pilot, and in case of necessity, may be attempted.

Carrameiro rock.—Another patch of $2\frac{1}{2}$ fathoms, the Carrameiro, lies off the east side of the island, 2 cables E.N.E. from its southern end.

It is proposed to establish a light on Boeiro rocks.

VIGO BAY* runs in about 15 miles in an easterly direction, from its entrance between cape del Home on the north, and cape Sillerio on the south, and is entirely enclosed with mountainous land, broken by cultivated valleys, which form a pleasing landscape. From the entrance, the bay gradually diminishes in breadth to the castle of Bestias on its north shore, 12 miles within, where it is only a third of a mile wide; within this it forms a basin to the north-east over 3 miles long, and in places $1\frac{1}{2}$ miles wide, but the water in it is shallow.

A series of small bays are formed on both shores of Vigo bay, between high projecting points. The bay on the north shore of entrance, between Subrido and Castros points, has a flat shore, off which vessels sometimes anchor with northerly winds in 9 to 11 fathoms, sand. The reef which extends one cable south of Subrido point is marked by a black cask buoy which is difficult to distinguish. Castros point and the shore half a mile westward, is of moderate height, and fronted by a reef extending over half a mile in a southerly direction, called Castros da Barra, the outer edge of which (Piedra Salaino) is marked by a black cask buoy, which is difficult to distinguish.†

Depth of Water.—*See Anchorage, page 327.*

Borneira point, $1\frac{1}{2}$ miles farther eastward, is low and salient, with a reef extending 4 cables S.S.W. from it, and near its outer end lies a rock called Bajo Borneira, which uncovers at low water, marked by a black conical buoy surmounted by a cage.‡

Three-quarters of a mile S.E. $\frac{3}{4}$ E. from Borneira point, is a small patch of $2\frac{1}{2}$ fathoms water, named the Zalgueiron rock, with 4 and 5 fathoms close round it, marked near its south-west edge by a black conical buoy with staff and cage.

On the east side of the point is the bay of Cangas, with a beach at its head, and the town of the same name; the bay terminates to the eastward at Rodeira point, between which and Con point, $1\frac{1}{4}$ miles farther eastward, the shore is fronted by an extensive ledge of rocks, covered at high water, the south-west extreme of which, the Punta

* See Admiralty plan :—Vigo bay, No. 2,548; scale, $m = 1.1$ inches.

† The buoys in the Gulf of Vigo are often out of position, and cannot be depended on.

‡ It is intended to establish a floating light on Boneira bank.

Rodeira shoal, is marked by a buoy coloured black and white, surmounted by a cage, and the Piedra de Pego, nearly three-quarters of a mile to the eastward and half a mile from the land, is marked by a beacon surmounted by a ball.

From Con point begins another bay and beach, and at its head is Bartolomé chapel on a steep black rock; from thence the eastern shore of this bay is high and rocky to Arroas point, off which is a large rock above water, named Arroas islet, lying $1\frac{1}{2}$ cables to the eastward. The shore then extends $2\frac{1}{2}$ miles eastward to Bestias point, between which and Ronde point, one-third of a mile to the S.S.W., is the narrowest part of the bay. Both points are clean and steep, and between them in mid-channel the depth is 16 fathoms, mud. Within these points the bay opens out, and forms to the north-east a shallow basin with depths of one to 3 fathoms water, the head of which dries at low tide; the river Sampayo disembogues in its north-east corner, and the river Redondela in its south-east; both are navigable for boats at high water, but the Redondela dries right across its entrance at low water springs, and immense quantities of sea-weed are then collected and taken up country for manure. On the east shore is San Simon islet, of moderate height, with large rocks at each end.

The southern shore of the bay takes a W.S.W. direction from Ronde point, 2 miles from which is the village and bay of Teis, at the foot of the hill of la Guia. This hill is 458 feet in height, round, steep, and of a reddish colour, with a chapel on its summit, and a castle with a light-tower well down towards the point; a sand-bank with shoal water extends $1\frac{1}{2}$ cables from its north and north-east sides, and one cable from its west side there is shoal water.

There is an off-lying shoal of $2\frac{1}{2}$ fathoms about 3 cables from the west side of the point, and another of $2\frac{1}{2}$ fathoms 2 cables from the north extreme; off its north-west face, is a large rock named Cabron islet.

Between the hill and the battery of San Andres, nearly $1\frac{1}{2}$ miles westward, is a bight with a beach, and the town of Vigo stands partly on the beach, and partly on the ground rising gradually behind it.

El Cabezón reef.—Bouzas point $1\frac{1}{2}$ miles westward of San Andres battery, is low and rocky, with a reef projecting 3 cables from it, called El Cabezón, which is marked by a red conical buoy.

Cabo de Mar shoal.—Cape Mar, $1\frac{1}{2}$ miles farther westward, is low and of a sandy colour; a reef, part of which is visible at low water, called the Cabo de Mar shoal (Piedra Brasileiro), extends 3 cables from it to the north-west, the out edge being marked by a red and white buoy.

From thence to cape Estay bearing S.W. by W. $\frac{1}{2}$ W. $2\frac{2}{3}$ miles, the coast forms a bight with a low shore, off which is a small island named Toralla, which is of the same height as the shore abreast, and at a distance appears to be part of it; the island is surrounded with shoals, and only separated from the land by a passage scarcely fit for coasters. Near the extremity of the reef at the west end, is a red buoy, which marks Rondana shoal.

Cape Estay is of black colour, and fronted by a reef which continues along the shore of the bight between it and monte Ferro. This hill is round, of a reddish colour, and has a look-out on its summit; its north-west extreme is named point Lameda, and its south slope forms the northern shore of Puerto de Bayona, which, having many shoals and sunken rocks in it, should not be entered without a pilot.

The best shelter is abreast the town of Bayona to the south-east of Tenaza point, which is the east extreme of a peninsular hill of moderate height, but steep over the sea, with the walls of an extensive castle on its summit.

The shoal water, which extends $1\frac{1}{2}$ cables from Tenaza point, is marked by an inverted conical buoy (Puerta Real), painted red.

The Piedra Baiña (Sta. Marta) shoal, near the head of the bay, is marked by a red triangular frame beacon with white cross.

Estela de Tierra island.—Three cables off the western face of monte Ferro is a small island, the Estela de Tierra, of moderate height, between which and the land is a narrow passage, with 3 fathoms water between the shoals, and may be used by small craft in case of necessity with a smooth sea, but there is a shoal of $2\frac{1}{4}$ fathoms in mid-channel, marked by a cask buoy (provisional) painted red, which must be avoided. At 2 cables westward of this island is another of equal size and height, the Estela de Mar, the passage between them being only $1\frac{1}{2}$ fathoms deep.

About three-quarters of a mile in a N.W. and W. by S. direction from Estela de Mar island, are numerous rocks, which dry at low water.

The town of Vigo, which stands in a small bend of the south shore, about 9 miles within the entrance of the bay, has good anchorage off it, and was of great importance as a port previous to the formation of the naval establishment at Ferrol.

The old town has a mean appearance from the sea, and it does not improve on acquaintance; it has no public buildings worthy of note, and the streets, although tolerably paved, are narrow, crooked and

ill-flavoured. The citadel, which stands on a hill 450 feet above the sea, overlooking the town, is in a wretched condition, and the battery near the landing place beneath the town is in a still worse plight. Some of the private houses, however, are well built, and give one an idea of competence, if not of wealth.

A new town is rapidly rising on the level ground to the eastward, and is of a totally different character ; here are broad roads or streets and lofty granite houses, with all the modern conveniences. The town is fronted by a substantial pier, alongside which steamers load. There are two landing places, one at the north-west and the other at the north-east part of the town.*

The farms in the immediate neighbourhood are small, but well cultivated, the spade doing the principal part of the work. The cultivation of the vine is the most important, and two sorts of wine are produced in the district, one, the cheaper sort, being a thin, red and astringent wine, drank by the peasantry ; and a white wine resembling hock in character and containing a much larger percentage of alcohol than the red. Next in importance to the cultivation of the vine is that of maize, of which two crops are produced annually.

The main roads leading out of Vigo are three in number, viz., the Pontevedra, the Orense and Madrid, and the Bayona and La Guardia. These roads are well constructed and well kept ; the cross roads, however, are quite impassable to every species of wheeled vehicle, except bullock waggons, which are suited to the country in its present condition.

The chief imports are cod-fish, coal, alcohol, &c., of the value, in 1889, of £176,417. The chief exports are cattle, wine, &c., of the value, in 1889, of £135,635.

1,633 vessels of all nationalities entered the port in 1889, representing an aggregate tonnage of 987,333 tons. There are no special Custom-house or quarantine regulations ; those in force apply to all ports on the coast of Spain.

There is a good foundry, where small repairs to machinery may be executed, and by taking advantage of the tide to ground the vessel, repairs to the hull may be carried out.

Water and other supplies may be obtained, of good quantity and at moderate prices.

* An iron pier, 645 feet long, is to be constructed by the junta de Obras del Puerto, and a line of railway will be laid to place the pier in communication with the rail way station. See Consul's Report, 1890.

There is steam communication with nearly all parts, and railway and telegraphic communication to all the principal towns. There are no diseases against which special precautions are necessary. There is no hospital or home for sailors.

Coal.—About 2,000 tons of coal are usually kept in store for steam purposes, the price being about 20 shillings a ton delivered alongside. The coal is stored in sheds, and coaling is performed by means of lighters. It is probable that floating depôts will be soon established.

Population, in 1886, amounted to 15,904. The British vice-consul resides here*.

Weather signals are made with cones and cylinders, on two black vertical stanchions established on the roof of a house, which stands to the eastward of the towers of the cathedral.

Telegraph Cables.—There are three submarine cables laid down, near each other, from point de la Lage to the south channel, thence the cable to England trends N.N.W. $\frac{1}{2}$ W.; the cable to Lisbon S.W. by S.; and the cable to Caminha (Camiña) S.S.W. passing cape Silleiro at the distance of about one mile. Mariners are cautioned not to anchor in the vicinity of these cables.

Anchorage.—Except in the neighbourhood of the points, the whole of the bay affords good anchorage in 11 to 23 fathoms, mud and sand. Staff-Commander J. R. Moss remarks, "I should think the largest fleet which could be brought together might ride out any gale in this really magnificent bay with impunity, provided their ground gear was good." The usual anchorage is off the town of Vigo in 11 to 6 fathoms, mud, sheltered by the Bayona islands from westerly winds, which throw in the heaviest sea.

The bay of Teis, the next bend of the shore eastward of Vigo, affords safe anchorage sheltered from all winds; vessels may lie here in 6 fathoms, with a cable fast to the shore, and an anchor to the northward. There is also sufficient space about a quarter of a mile eastward of Bestias and Ronde points, at the entrance of the shallow basin, for a number of vessels to lie in 15 to 6 fathoms safe from all winds.

There is also an outside anchorage in 11 fathoms, sand, off the east side of the low sandy neck, uniting the two parts of the northern of the Bayona islands.

* Revised from information furnished by H.B.M. Vice-Consul, 1887 and 1890; also from remarks by Staff Com. Moss, H.M.S. *Agincourt*, 1880.

The other parts of this basin may also be serviceable to vessels taking the bay without anchors or cables, as they may run aground anywhere on the mud, until necessities be procured, and then by lightening they may be got off without the least damage.

Ships from infected places, or with infectious cases on board are not permitted to anchor off Vigo, but must proceed through the narrows and anchor above Bestias and Ronde points.

The Quarantine buildings on San Antonio and San Simon islands are substantial and extensive.

Caution.—Mariners are again cautioned not to anchor in the vicinity of the sub-marine telegraph cables. (*See page 327.*)

BUOYS.*—The following buoys are moored in Vigo bay :—

North shore.—Punta Subrido buoy is a black cask buoy. The south extreme of Castros da Barra (Piedra Salaino) is marked by a black cask buoy. A black conical buoy, surmounted by a cage, is moored south of Bajo Borneira. Zalgueiron rock is marked by a black conical buoy with staff and cage ; at the south-west extreme of the reef, extending from Rodeira point, is a black and white buoy surmounted by a cage.

South shore.—The Rondana shoal is marked by a red buoy, and the Cabo de Mar shoal (Piedra Brasileiro), by a red and white buoy. A red buoy, marks the El Cabezón, off Bouzas. There are several mooring buoys off the town of Vigo.

Buoys marking telegraph cables.—Two buoys are moored off Vigo to mark the position of the telegraph cables.

The outer buoy, red with staff and ball, is moored in 11 fathoms, with point del Castro bearing S.E. by E. $\frac{1}{2}$ E., distant 4 cables.

The inner buoy, red with staff and ball, is moored in 10 fathoms, with point de la Lage, Vigo point, bearing south, distant 2 cables.

CAPE SILLEIRO, the south point of entrance to Vigo bay, is high and rugged, and may be known by the light-coloured granite light-tower, 34 feet high, standing on it about 30 yards from the water's edge. The first story is square, the two upper octagonal, and the tower is joined to the keeper's dwelling.

The extremity of the cape is a low point, which terminates in a ledge of rocks extending three-quarters of a mile N.N.W. $\frac{1}{2}$ W., a

* The buoys are often out of position, and their description cannot be depended upon ; when damaged in bad weather, they are temporarily replaced by others. Report in 1889.

The Telegraph buoys were not seen when H.M.S. *Active* visited Vigo in September, 1887.

part of which dries at low water, and the sea breaks when there is the least swell.

Caution.—The Restinga de Laxe reef, and los Castros de Agoeiro, bearing from it about N.W. by N., distant $2\frac{1}{2}$ miles, were formerly buoyed; these are the dangers on either side of the southern entrance to Vigo bay, and it may be in contemplation to replace the buoys which have disappeared.

LIGHTS.—**Cies or Bayona islands.**—The lighthouse on monte Faro, the highest and most prominent part (at the south end) of the northern of the Bayona islands, exhibits, at an elevation of 604 feet above the level of the sea, a *fixed white* light varied by a *flash every minute*, and should be seen, in clear weather, from a distance of 20 miles. The eclipses are not total within the distance of 10 miles.*

Caution.—Too much dependence should not be placed on the regularity of the revolution, or the duration of the eclipses of Cies light.

Cape Silleiro.—The light-coloured granite lighthouse on cape Silleiro exhibits, at an elevation of 72 feet above the sea, a *fixed white* light visible 14 miles.

La Guia.—On the castle of La Guia, near the point of that name about $1\frac{1}{2}$ miles eastward of Vigo, is exhibited, at an elevation of 102 feet above the sea a *fixed white* light, varied every *three minutes* by a *flash*; visible in clear weather from a distance of 10 miles.

Pilots for Vigo are in general on the look out for vessels in the neighbourhood of the Bayona islands, in the daytime only.

Tides.—It is high water, full and change, in Vigo bay at 3 h.; springs rise 12 to 13 feet, and run about half a mile an hour; the rise is much influenced by the wind.

A rescue station is maintained at Vigo.

Directions.—Vigo bay is readily known when approaching from north or south by the islands of Ons and Bayona. At a distance in the offing, however, these islands appear to be part of the main land, and it will then only be known, if the weather is clear, by monte Curota, 28 miles northward of the south entrance, and by monte Señora del Alba, which is a sharp pointed hill, with a chapel on its summit, about 3 miles inland on the south shore of the bay, and by monte

* Revolution reported 40 seconds in 1888. It is proposed to establish a semaphore.

Santa Tecla, which is the most conspicuous hill in approaching Vigo from the southward (*see* p. 331). The land is high and level to the southward of the entrance; and no opening will be seen until at the mouth of the river Miño. The bay may be entered by the north passage between cape del Home and Caballo point, the north extreme of the Bayona islands; or by the south passage between the dangers south-west of the southern island and those extending westward from monte Ferro. In a case of necessity, vessels may, if their draught will permit, run through the passage between the Bayona islands.

To enter by the north passage, which is the best with a northerly wind, and from the clearness of the marks is to be preferred to the southern channel, although the latter has the great advantage of being straight, steer with mount Señora del Alba, which has a double peak and chapel, easily recognized, and may be seen over the Bayona islands long before entering the channel, just over cape del Home on a S.E. by S. southerly, bearing, until monte Ferro, the round bare hill, of somewhat ruddy colour, and easily picked out, on the south side of the entrance to the bay, is seen in the middle of the passage, bearing South. Keep the mount on this bearing until southward of Caballo point, when steer in mid-channel, and haul gradually into the bay, giving a wide berth to the dangers. When to the southward of Subrido point the town of Vigo, commanded by its ancient and dilapidated stone castle is seen, and between that and mount Guia (crowned by a whitewashed chapel) will be seen the shipping. To the right of Vigo, showing very conspicuously, is the church of Bouzas, a fishing village about a mile to the westward of Vigo. On the northern shore is the large and flourishing fishing village of Cangas, which possesses most of the boats in the bay. Monte Ferro open, of the east side of the north Bayona island, clears the Biduido shoal.

The chapel on the summit of the hill of la Guia bearing East, in line with a round topped hill at the back, leads up to the anchorage off Vigo. This chapel is not readily recognized by a stranger; it is a very small whitewashed building upon a hill, apparently half the height of those beyond it, and is the next projecting land beyond Vigo.

To enter by the south passage, the rocks off cape Mar in line with point la Guia bearing E. by N. $\frac{1}{3}$ N. will lead in mid-channel between the Castros and Restinga de Laxe shoals, in depths of 32 to 27 fathoms. When the high summit of mount Faro de Domayo bears N.E. by E. $\frac{1}{3}$ E.

steer for it, until the chapel on the hill of la Guia bears East, when proceed as before.

In proceeding from the anchorage all dangers on the north side will be cleared by not shutting in mount Capilla de la Peneda, with a chapel on the top; or the quarantine buildings on Simon and Antonio islands with Bestias point until the north point of Bayona islands open of Subrido point.*

At Night, with cape Silleiro light bearing S.E., bring the *fixed* and *flashing* light on Faro island to bear N.E. $\frac{1}{2}$ N., and then steer E. by N. $\frac{1}{3}$ N.; should the *flashes* of la Guia light be seen, keep it on this latter bearing until cape Silleiro light bears S.S.W., distant $3\frac{1}{2}$ miles, then steer about N.E. by E. $\frac{3}{4}$ E. until la Guia light bears E. $\frac{1}{4}$ N., and proceed as before.

Should the wind prevent the vessel from following these courses, give a wide berth to the ledges extending from the different points and to the Zalgueiron rock, and do not approach the shore to a less depth than 8 fathoms. To clear the Borneira reef, keep Caballo point (the north extreme of the Bayona islands) open of Subrido point until Cangas church is well open.

The coast from cape Silleiro trends about S.S.W. 14 miles to the entrance of the river Miño, and is nearly all the way bordered with rocks. Orulluda point, $4\frac{1}{2}$ miles southward of the cape, is a little salient with some large rocks off it. About 2 miles beyond the point and close to the shore is the town of Oya, with a small rivulet. Nearly 6 miles further on is the little town and port of la Guardia, a small creek used by fishing craft. The coast is backed by a lofty rugged range, rather level along the summit, which begins at cape Silleiro.

Monte Santa Tecla.—About a mile southward of la Guardia is a hill named monte Santa Tecla, having two peaks, on the highest of which is a chapel. This hill greatly resembles monte Louro, the

* The leading mark for the southern channel is too long a one, and the rocks off Cabo de Mar too distant and ill-defined to be used with any confidence when approaching from seaward. Cabo de Mar itself is composed of white sand and readily picked up.

As the channel is 2 miles wide in its narrowest part no leading marks are required, occasional cross bearings will ensure a safe course, remembering that on the south side all the dangers are visible.—Staff-Commander Moss, H.M.S. *Agincourt*, 1880.

Castillo dell Castro in line with Toralla island bearing E. by N., seems a good leading mark in when la Guia cannot be made out, which is often the case.—Lieut. F. Tottenham, H.M.S. *Curlew*, 1887,

north point of entrance of Muros bay, and serves to indicate the position of the Miño, of which it forms the north side of entrance. It is the most conspicuous hill in approaching Vigo from the southward, and especially useful in making a landfall. There is also a very conspicuous white patch on the south side of the entrance to the Miño.*

The RIVER MIÑO rises in the north-east part of the province of Galicia, about 40 miles north-east of Santiago, and from thence flows southward until it reaches the borders of Portugal. It then takes a westerly direction, and forms the boundary between Spain and Portugal to the sea, which it enters after a course of about 130 miles. The entrance between Picos point on the north, and Castillo point on the south, is $1\frac{1}{4}$ miles wide, but nearly midway is a small low islet named Insua, with a fort on it. Formerly there was a channel on both sides this islet, and that on the south side (called the Portuguese entrance) was the best; but the sands in this channel now dry at low water springs, while the channel on the north side (called the Spanish entrance) has $5\frac{1}{2}$ feet in it at that time of tide.

The Miño being barred, and having many banks within, which change their shape and position according to the strength of the current, can only be navigated by vessels of light draught, with an experienced pilot. A short distance within the bar there is a small space with about 3 fathoms water, but off Camiña there is only one fathom. This small town stands on the left bank, about $3\frac{1}{2}$ miles within, and is strongly fortified.† The inhabitants are chiefly employed in fishing and the manufacture of salt. The river is navigable for small craft to Moncao, on the left bank, about 21 miles farther up.

Navigability.—The Miño can only be navigated by vessels of light draught. There are only $5\frac{1}{2}$ feet in the channel at low water springs.

Light.—From the lighthouse on Insua island, about half a mile within the entrance of the river Miño, is exhibited, at an elevation of 56 feet above the sea, a *fixed white* light, visible in clear weather through an arc of 240° , or between the bearings of S. $43\frac{1}{2}^\circ$ W., through East, and N. $16\frac{1}{2}^\circ$ W., from a distance of 9 miles.

The lighthouse is constructed of iron, and is painted red.

Tides.—It is high water, full and change, on the bar of the Miño at about 2 h. 30 m., and ordinary springs rise 7 feet.

* It is proposed to establish a light at Port la Guardia.

† There is a submarine cable from Camina to Vigo. See page 327.

CHAPTER VI.

COAST OF PORTUGAL. RIVER MIÑO TO RIVER GUADIANA.

 VARIATION IN 1891.

River Miño - 19° 10' W. | Cape St. Vincent - 18° 0' W.

COAST.—There is no available harbour of refuge along the whole coast of Portugal between Vigo and Lisbon. From the entrance of the river Miño the shore runs in a southerly direction for about 44 miles to the entrance of the river Douro. From monte Santa Tecla to the mouth of the Lima, the coast is of moderate height, but backed by the Sierra de Santa Lucia, 1,814 feet above the sea, which rises a little inland, higher than the land to the northward, and visible seaward from a distance of over 50 miles, forms a good mark for distinguishing this part of the coast. About 3 miles southward of monte Tecla is the mouth of the little river Ancora, with anchorage off it for small craft in fine weather, and 5 miles farther on, is a point with a round hill called mount Dôr; the shore here should not be approached nearer than 7 or 8 fathoms water. The town of Areoza, forming an amphitheatre, may be seen on the slope of mount Santa Lucia.*

RIVER LIMA.—This river rises in the sierra de San Mamed, and enters the sea at Vianna, after a course of about 60 miles. Its mouth is 11 miles southward of monte Santa Tecla, between two low points, and fronted by rocks and shoals, which partly protect it from the sea. The bar offers no impediment to navigation as the channel is always open, the course of the river being diverted by means of artificial works.

The river swells out near its mouth into a broad estuary, more than two-thirds of the area of which is exposed at low water. On the northern bank there is a wet dock and quays, and on the same side of the entrance, a cluster of rocks and a breakwater, all of which serve to direct the stream of the river to the southward, which prevents the accumulation of sand. A pilot is necessary to enter, and the principal anchorage is within the southern point.

* See Admiralty chart:—Cape Finisterre to cape St. Vincent, with plans, No. 87; scale, $d = 6.0$ inches.

Depth of water.—There are 7 or 8 feet water over the bar at low water, and vessels of 13 or 14 feet draught cross it at high water; the river is navigable for small craft up to the bridge of Lima, 9 miles from the entrance.

Vianna do Lima is a fortified town, standing on the north bank of the river Lima; and having a white appearance, it is visible at some distance. It carries on a fair trade in salt fish with Newfoundland. A fort on the point commands the entrance.

LEADING LIGHTS.—**Front light.**—From the lighthouse in the south-west battery of the fort, on the northern side of the entrance to the river Lima is exhibited at an elevation of 48 feet above high water, a *fixed white* light visible, in clear weather, between the bearings of S. 9° E., through east and S. 81° W., from a distance of 11 miles.

Rear light.—From the lighthouse, which is situated N. 32° E., distant 550 yards from the front light, is exhibited at an elevation of 107 feet above high water, a *fixed red* light, visible, in clear weather, between the bearings of N. 9° W. and N. 51° E., from a distance of 7 miles.

The lights in line, bearing N. 32° E., lead over the south bar of the river. The lighthouses are cylindrical in shape, painted red, and are surmounted by white cupolas.

Semaphore.—On the south-west corner of the fort there is a semaphore station with which vessels can communicate by the International code.

Anchorage.—In fine weather vessels may anchor off the mouth of the Lima in 8 or 9 fathoms water, with the town bearing E.N.E.

Directions.—A vessel should have a pilot to enter the Lima, but if unable to obtain one, and in case of actual necessity, the following directions may enable the mariner to save his vessel. It is necessary to double the rocky ledge which extends nearly a mile southward of the entrance; to do which, bring a small round hill, covered with pines, on the south shore opposite the town to bear East, and steer for it till at the distance of half a mile from the shore; then haul to the northward, passing nearer the rocks—or about two-thirds over—then the west extremity of the south point, until the river is well open, then steer in, thus entering from the south.

The south shore is of low sand terminating in a sharp point at the entrance, from which a wooden pier or breakwater projects seaward, and off it the sand banks dry at low water. The channel for some

distance is between the sandy shore and the rocks; a rock said to be covered at high water lies southward of the main ledge, which is left on the port hand. There is a northern passage which is the deeper but narrower, and runs nearly east and west; the southern lying nearly north-east and south-west is preferred, as being the wider and easier to take.

ST. BARTHOLOMEW ROCKS.—For 3 miles southward of Vianna, or as far as the bar of the Nieva, the shore is a low beach when it becomes higher and level, backed by high land as far as Villa do Conde, at the entrance to the Ave, 17 miles farther on. The St. Bartholomew or Pedra do Pontel rocks, to the southward of the river Neiva, and the Raven rock to the south-west of them, are $2\frac{1}{2}$ miles and $2\frac{1}{2}$ miles off-shore respectively. These dangers are formed of several patches, some of which show themselves at low water, and others are always covered. This part of the coast should not be approached nearer than 4 miles, nor into less than 11 fathoms water. To the southward of these rocks, the coast is foul and should be approached with great caution.*

RIVER CAVADO rises in the sierra de Jerez, on the frontiers of Galicia, and after a course of 65 miles to the south-west runs into the sea between the towns of Espozende and Faõ. Espozende, is the principal place, and stands on the north bank, nearly opposite Faõ, a short distance from the coast.

Depth of water.—None but small vessels can cross the bar there being only 7 feet over it at high water, and even then a pilot is necessary, as the bar shifts with fresh winds and strong tides. The river is navigable for about 7 miles.

DANGERS.—There is a sunken rock lying nearly 2 miles from the shore abreast Cavado river entrance, with Espozende light bearing about E. $\frac{1}{2}$ S. Abreast of Faõ, $1\frac{1}{2}$ miles from the coast, there are two rocky ledges, even with the water's edge, and parallel to each other; they are named Cavallos de Faõ. Nearly 2 miles south of Cavallos de Faõ, and about one mile from the shore, there are two dangerous sunken rocks. This part of the coast should not be approached nearer than 3 miles; but to the southward of these rocks, a vessel may stand into 10 or 12 fathoms until near the reefs northward of Villa do Conde.

A little to the north-west of the lighthouse at Povia de Varzim there is a ridge of rocks.

LIGHT.—A *fixed red* light is exhibited at the old fort of Espozende, at an elevation of 45 feet above the level of the sea, visible in clear weather from a distance of 7 miles.

RIVER AVE.—The mouth of this river is about 12 miles southward of the bar of Espozende; for the first 8 miles, the shore is low and sandy, with the mountains of Franqueira lying nearly parallel with it, a few miles inland; at Avelamar, the coast becomes higher, and trends more easterly to the mouth of the Ave.

Villa do Conde is a small seaport town, on the north bank near the mouth of the Ave. On an elevation near it is the convent of Santa Clara, surrounded by houses which have the appearance of a small town; this and its high long aqueduct parallel to the coast, are generally the first objects seen from a distance at sea; they are visible 16 or 18 miles. Opposite Villa do Conde, and on the left bank of the Ave, is the small town or suburb of Azurara, with a remarkable church steeple; and by these objects, the entrance of the river may be easily recognised.

Dangers.—There are numerous rocks above water before the bar of the Ave, and others to the northward near the coast, amongst which there are passages, but they are intricate and dangerous; it is therefore more prudent to pass to the southward of them all if intending to enter the river, in order to cross the bar.

Bar.—Vessels drawing more than 8 feet water cannot enter the river, and as the bar shifts at times, a pilot is necessary.

LIGHT.—At Pova de Varzim, 2 miles north of Villa do Conde, a *white* light is shown occasionally in dark and foggy nights, and when the fishing boats are at sea. The light appears *revolving* to the south and north, but its revolving character is less marked from the westward.

ORESTES ROCK.—This danger, on which H.M.S. *Orestes* struck in 1833, was considered to lie $3\frac{1}{2}$ miles from the shore; with the north part of the village of Villa do Conde bearing E. $\frac{1}{2}$ N. and the south part E. $\frac{1}{2}$ S. This rock was found to be steep-to; at the distance of one cable from the rock no bottom could be obtained with the hand line.

To avoid this dangerous ground, vessels in the neighbourhood of Villa do Conde should be careful not to approach the shore nearer than 4 or 5 miles.

Coast.—From the bar of the Ave, the coast trends 9 miles southward to the artificial harbour of Leixões which encloses the mouth of the river Leça. It is mostly a sandy beach with low land, but there are hills of moderate height in the interior; and near the shore are some rocks above water.

LEXICÕES HARBOUR, situated about $2\frac{1}{2}$ miles northward of the bar of the Douro, is about 250 acres in area, formed by two parallel breakwaters 5 and 9 cables in length, and 6 cables apart, extending in a south-west direction from the shore. The outer portions curve towards each other, leaving an entrance open to southward 250 yards in width, with a depth of 8 fathoms. In the centre of the harbour there is about 5 fathoms, decreasing towards the shore to 3 fathoms at about one cable off. The bottom is composed of sand and rock. The outer part of the northern arm is built on the Leixões rock and foul ground extends $1\frac{1}{2}$ cables seaward of it. The north-east corner of the harbour is enclosed by two moles each about one cable in length with an entrance 80 yards wide and depths of 6 to 10 feet.

The harbour is now open to commerce, but no lights or buoys have as yet been established.

The Mail steamers are to call here.*

Vessels unable to cross the bar of Oporto use the harbour. It is to be connected by railway with Oporto.

Towns.—On either side of the mouth of the Leça, the small stream at the head of the harbour, are the small towns of Leça da Palmeira and Matosinhos.

Tides.—It is high water, full and change, at Leixões harbour, at 1 h. 49 m.; springs rise $12\frac{1}{2}$ feet.

RIVER DOURO.—From Leixões harbour, a sandy beach trends in a southerly direction $1\frac{1}{2}$ miles to fort Queijo (Black fort), from whence the land begins to be rocky and more elevated, but continues in nearly the same direction $1\frac{1}{2}$ miles farther to fort San Joao da Foz, on the north point of the mouth of the Douro. This river takes its rise in the sierra de Urbion, in Castile, and traverses the most mountainous portions of Leon and Salamanca before it reaches the Portuguese frontier. In Portugal it passes through the soft crumbling granites of Tras-os-Montes, and then enters the long strip of country in which port wine is produced. From thence to Oporto the land is laid out in vineyards, wherever the soil along the banks admits of the vine being cultivated.

* See plan of Leixões on Admiralty chart No. 87; scale, $m = 6$ inches.
SO 10809

The course of the Douro lies mainly through a soil, which, during heavy rains, is easily carried down by the stream ; and in Portugal its channel is everywhere narrow, with a rocky bed. The waters being thus confined, the strength of the current is considerable, and at some points its rate is said to exceed 9 miles an hour, and the average rate is probably not less than 3 miles an hour. Grain and other produce is floated down from Spain on flats, but its navigation is frequently interrupted, from the swelling of the river by rain and melted snow.*

Navigability.—The Douro is navigable for vessels for 70 miles from the entrance, and boats of light draught may proceed 30 miles higher. (*See also* page 341.)

Leixões harbour, p. 337, is available for vessels that cannot cross the bar.

Oporto, the second city of Portugal, and having a population in 1878, of 105,840, stands on the side of a steep eminence of about 200 feet elevation, which rises from the north bank of the Douro, about 2 miles from the sea, and is bounded by hills 500 feet high, of which that of Congregados is the most elevated ; these heights are fortified, and the city is otherwise defended by lines of defence, bastions, &c. The houses extend on the north side to the Lapa convent, and are continued along the shore for a considerable distance down the river. The climate is considered healthy, but the heat during July and August is oppressive.

The city is profusely supplied with excellent water, and the necessaries of life are abundant and cheap. Wine is the chief article of trade, and no less than 41,558 pipes of port have been shipped in one year ; oil, shumac, fruit, wool, cream of tartar, salt, leather, and cork, are also exported.

The chief imports are corn, beef, sugar, coffee, deals, woollen and cotton goods, hardware, rice, hemp, flax, and dried fish.

There is steam communication with Liverpool, Lisbon, &c., and railway communication with Lisbon and other towns.

There is a hospital and dispensary for British seamen. Many English families reside in the city and suburbs.

Coal.—A good supply of coal, the property of private companies is kept in store, the price being from 20 to 26 shillings per ton.

Supplies.—Fresh provisions are plentiful and good.

Water.—Messrs. Coverley & Co. own a large water lighter, and can supply fresh water pumped into ships' tanks.

Villa Nova de Gaya, formerly called Cale, was the original town. It extends along the south shore of the river, opposite Oporto,

* See Admiralty plan, Entrance of the river Douro, on chart Cape Finisterre to Cape St. Vincent, No. 87.

between the Serra convent and the heights of Furada; in it are the principal wine lodges and depôts: it formerly gave the name of "portus cale" to the port, from which, it is said, the present name of the kingdom is derived. A handsome suspension bridge connects Oporto with this town.

LIGHTS.—Near the chapel of Nossa Senhora da Luz, on the north side of the river, is a square white tower with a red band 6 feet wide, from which, at an elevation of 170 feet above the level of the sea, is exhibited a *flashing white* light every *minute*, and visible in clear weather at from a distance of 15 miles.*

From the outer extreme of Felgueiras mole, about 300 yards southwest of San Joao da Foz, is exhibited, at an elevation of 42 feet above high water, a *fixed green* light, visible in clear weather from a distance of about 2 miles, through an arc of 229° , or between the bearings of S. 26° E., through north, and N. 75° W.

It is intended to establish a fog bell at this lighthouse.

Semaphore.—At Nossa Senhora da Luz lighthouse, there is a semaphore station, with which vessels can communicate by the international code.†

Aspect.—The land in the vicinity of Oporto may be easily recognized, as the heights of Monte da Rabida and of Furada, which form the river gap, being 200 feet high, and only $1\frac{1}{2}$ miles from the coast, will point out the entrance of the river by the peculiar haze behind them. It may also be known at a considerable distance, if the weather be moderately clear, by the hills of Congregados and Lapa, on the northern limits of the city. The latter hill, which is the nearer of the two, and 500 feet high, may be distinguished by a round tower near a gloomy-looking convent on the heights over Matozinhos. On the southern range, and at nearly the same distance from the Lapa, is San Ovidio; and, at the entrance close to the water, the church of San Joao da Foz, if the weather be fine, is also very conspicuous.

To a vessel coming from the southward, into 12 fathoms water, the probable outline of the land to the northward will be the Queijo fort, black, with four white-capped turrets at its angles; Crasto hill, flat-crowned, and rising close north of the lighthouse. The coast to the southward of the Cabedello or sandspit, is sandy, but may be distinguished from it by the fishermen's huts, which commence

* The action of this light is reported to be irregular.

† See Meteorological Signals, page 7.

a few miles to the southward, and continue a great distance. Should the weather be too hazy to distinguish the outline above described, it will be necessary to pay attention to the soundings.

Off the bar, in 9 fathoms, the bottom is hard and sandy; to the northward or southward of it the sand is mixed with mud, but the two moles at the artificial harbour of Leixões (*see* page 337) will be a sufficient guide to the bar, which lies about $2\frac{1}{2}$ miles to the south of the harbour.

If, on making the land in hazy weather, its higher outline cannot be defined, it will be well to look narrowly to the beach, bearing in mind that, although a considerable range of sandy beach lies to the southward of the Douro, yet it is there studded with huts, whereas none are to be seen near the Douro. Should the beach appear to be sand, with a few boulders or large rounded rocks, the eye should be carried northerly, to ascertain whether the slope of the dark land terminates in sand, with a clump of these boulders there, as well as on the land. If this be the case the vessel will be to the southward of the bar, and off its shoalest part. By tracing the sand (which is a long spit) northerly, the fort of San Joao da Foz will be discerned, and the Felgueiras mole which connects the Felgueira rock with the main land, and protects the northern side of the entrance to the river.

If, on the other hand, the shore should exhibit rough rocky ledges, with sandy bays between them, the vessel will be to the northward of the bar, and the Black fort (Queijo) will be seen where the long sandy beach commences to the northward. Here the water should not be shoaled to less than 10 fathoms.

Approaching the bar.—The city of Oporto may be seen in clear weather from the distance of 12 or 14 miles. The steeple of Los Clerigos is a very prominent object, and when brought E.S.E. the land may be approached on this bearing until this water shoals to 9 fathoms.

At night a vessel should not go into less than 15 fathoms, unless the weather be very fine, in which case she may run into 12, where it would be advisable to anchor until daylight, as in the event of calms, currents, morning fogs, or easterly winds, much delay and loss of tide might be occasioned.

The bar of Oporto is an unsafe lee shore, especially with the wind from West to S.W.; but, with the wind from N.W. vessels may with safety approach to examine the state of the bar, provided always that the latitude be known (or land made out), and the usual precautions of the lead and a good look-out be attended to. If the weather should

be so hazy that San Joao da Foz fort and the lighthouse cannot be distinguished, it will be unsafe to approach the bar ; at the same time it should be borne in mind, that, if the haziness commenced before 10 a.m., and not the result of bad weather, it may be expected to clear off about noon.

It is unsafe to trust boats outside the bar on the ebb, unless they have a vessel to resort to, as the overfalls on freshes or springs would prevent their evading any roller which might follow them in.

The anchorage outside the bar is good in any depth between 10 and 14 fathoms : but if bad weather be anticipated, Leixões artificial harbour should bear at least North from the anchorage. Vessels waiting for the tide to cross the bar will find comparatively good anchorage in $5\frac{1}{2}$ fathoms. Slip ropes and buoys should always be on, as the swell at times renders weighing dangerous, as well as impossible.

Bar signals used at the telegraph adjoining Nossa Senhora da Luz lighthouse :—A drum at masthead, and one at each yard arm, signifies close the bar. A drum at each yard arm, you may be piloted if you approach. A drum at masthead and one at right yard arm, you cannot be piloted. A drum at masthead, the coast is dangerous, keep at a distance.

The bar is now greatly improved, no wrecks have taken place on it for a long time, although some years ago they were of frequent occurrence, but the bar is very narrow. 1890.

Although the bar may at times be impassable, it does not follow that there can be no communication with the shore, as even at half-ebb, the worst time of tide for the bar, boats can go off from the beach between Foz and Nossa Senhora da Luz lighthouse, and nearly always from the huts of monte Crasto. The boats used for this purpose (Catraias) go through very heavy seas safely, when no ships' boats could live.

The western swell being checked by the freshets from the Douro, the rollers on the bar become terrific, and not unfrequently detain vessels entering or departing for five or six weeks.

Navigability.—Vessels of 17 feet draught can navigate the channel, and enter the port at high water neaps ; and vessels drawing from 10 to 11 feet can do so at low water springs. A vessel drawing 20 feet is the greatest draught vessel which has visited the port.*

* From Report of H. Grant, Esq., H.B.M. Acting Consul. September 1888, and December 1890

Tides.—It is high water, full and change, at the bar of Oporto, at 2h. 30m. ; springs rise on an average about 10 feet, and neaps 8 feet, which may be further increased by nine inches or a foot in easterly winds. The pilots affirm that in the heaviest freshets the tide is not increased on the bar more than one foot.

The freshets are occasioned more by extensive thaws in the mountainous country which feeds this river, than by heavy rains, and may be expected in their greatest force during the months of March and April,—even as late as May,—but the increased rise and rapidity of the tides which is occasioned by rain alone, may occur between November and May. The latter do not produce any dangerous consequences ; but the effect of thaws and rain combined, occasions such an increase in the rapidity of the stream, that vessels cannot then trust to their anchors, which are sometimes undermined by the current, and not unfrequently trees and other large bodies are brought down by the stream.

The rise of the river under these circumstances is very great. It is said by actual measurement to be 10 feet above springs, and the velocity from the sudden fall at the bend has been estimated by the pilots at almost 14 miles.

Precautions.—During the freshets the vessels are secured in tiers, the innermost being secured to stone bollards or rings let into the piers for the purpose, and are kept about 40 feet from the shore by brows both forward and aft, and well lashed to admit of rising. During the months of March and April additional precautionary measures will probably be necessary. It is said that the eddy, during the freshets, has been strong enough to bring a boat from Lazaretto point up to the Cavaco gate.

Pilots.—The constant shifting of the sand forming the bar renders it necessary to sound the channel every three or four days, and to maintain a numerous body of experienced pilots, who are always ready to go off between sunrise and sunset, when a vessel is in sight, unless the weather prevents their getting out, or if the marks cannot be seen. At night they can rarely be obtained, and only in very fine weather. The pilotage dues are heavy.

Life-boats.—A society at Oporto for the rescue and assistance of wrecked seamen, and an establishment with life-boats and apparatus for reaching vessels in distress, is maintained on the banks of the Douro, just within the bar.

Anchorage in the river.—The best anchorage is in the bight of San Antonio, where the freshes cause a kind of eddy, and as near

the convent as possible; not allowing the dome of the Serra Convent to be seen outside the quay. There will be no danger of grounding at low water springs.

A good berth for a vessel of war will be to bring the wine company's store (a white house, on the starboard bow), and the eastern red gate of the garden wall of the Cavaco abreast the starboard gangway. It is customary to make the starboard bower cable fast to the shore.

The holding-ground in the stream is very loose; however, a bower is usually laid out there at a long scope for the off strain, and as the stream swells gradually heave in shore, until the starboard cable is nearly ahead. In this position but little strain is experienced, and the port chain will bury itself in the mud, which is very deep.

Directions.—The channel is marked with iron buoys, between which vessels should pass; but as the aid of a pilot is requisite for the safe navigation of the river, it is unnecessary to give directions. No merchant vessel is allowed to enter the river without the assistance of a pilot.

Coast.—From the bar of Oporto the coast trends with scarcely any deviation about S.W. by S. 94 miles to the north point of Pederneira bay, on which is the church of Nazareth. Nearly the whole distance is a sandy shore, but some 13 or 14 miles inland a range of hills, called the heights of Feira, continues rising from the banks of the Douro, and at about 18 miles to the southward they become more elevated, and form the peak of Ornellas or Carregoza, which may be seen 28 miles from the coast. The hills become less elevated as they continue thence to the southward, where they unite with the mountains of Saude and Talhadas, and these join the high peak of Caramullo.

These mountains lie nearly parallel with the coast, and the Caramullo slopes gradually to the southward, and may be seen 45 miles off, or 20 miles westward of the land near Aveiro, for which and Oporto it is a good mark, and the only distinct object to be seen above the sandy plain of the coast. The configuration of Caramullo is so like that of Ornellas that it is necessary to consider the latitude to prevent mistake.

Immediately to the southward of the bar of Oporto, a beach, for the most part rocky, extends to the south for about 3 miles, and thence to the S.S.W. From the first fishermen's huts, named Espinhos, the shore is a sandy beach with huts dispersed along it,

and one remarkable building named Casa Branca (White House), about 6 miles south of Espinhos. Here, on rising ground, 6 miles inland, is seen the town and castle of Feira, which is easily distinguished from sea in clear weather.

At 17 miles beyond Casa Branca is the new bar of Aveiro; the whole of this coast is clean, and may be navigated as near as 2 miles, in 10 or 12 fathoms water; but in hazy weather, if the peaks of Caramullo and Ornellas are not visible, it is difficult to distinguish the particular parts of the coast, the peaks and the tower of Aveiro being the only remarkable points on this low sandy shore; also, the vapour and sand raised by the heat and wind, render it frequently very difficult to see the mountains, so that it is necessary for the mariner to be certain of his latitude when running for the bar of Aveiro.

LIGHT.—Aveiro.—*Light proposed.*

RIVER VOUGA rises in the north-east of the province of Beira, and after a course of about 60 miles flows into the sea at the new bar of Aveiro, rendering the province one of the richest and most fertile in Portugal, and facilitating its commerce and the exportation of its productions by its commodious navigation. The entrance is about 29 miles northward of cape Mondego, in lat. $40^{\circ} 38\frac{1}{2}'$ N., and maintained by a dyke thrown up about a mile to the southward of the hermitage of San Jacinto. A circular white tower, 73 feet high, has been erected in the fort, nearly a mile east of the bank at the bar, to point out its position, and from which signals are made to vessels approaching the bar.

The harbour has sufficient depth and space for a great number of vessels, there being good anchorage in 3 and 4 fathoms water, from the dyke to the town of Aveiro, and thence nearly all the way to Ovar, a distance of 9 miles.

The town of Aveiro stands in a flat marshy country upon both banks of one of the arms of the Vouga, about 4 miles from its mouth, and on such low land that it can only be seen at a short distance. Its manufactures are earthenware; and salt from the marshes is procured in large quantities. There is an active fishery, and its oysters are celebrated.

Bar.—The depth on the bar at high-water springs is from 12 to 13 feet, at high-water neaps 10 feet, and immediately seaward of it there are $6\frac{1}{2}$ fathoms. In the channel, made through the beach between the dyke and the north shore, there are from $3\frac{1}{2}$ to 8 fathoms.

The hermitage of San Jacinto near the shore, half a mile northward of the bar, serves as a sea mark, but is difficult to be discerned 4 miles off, and the tower has been erected for the purpose. It is necessary to obtain a pilot before entering the river, as the tides are rapid, and no directions can be given on account of the unsteady nature of the sands.

When the sea is smooth the entrance is easy, and accessible with all winds, except when blowing strong from the eastward, and with south-east winds there is much sea. In case of a heavy sea preventing boats going off, vessels of about 9 feet draught may run for the bar at three-quarters flood, providing the wind is fair and sufficient to keep the vessel under command. In fine weather vessels may anchor outside, near the bar.

Bar signals.—On approaching the bar great attention should be paid to the signals from the tower and pilot boat, which are made by a staff with a flag attached to it. When the staff is inclined to the north or south the vessel should steer in the direction to which it inclines, and if it is held upright she should steer direct on. When a red flag is hoisted at the tower it is a signal that vessels can enter, but they ought not to approach near the shore unless the flag remains hoisted.

If the red flag is hoisted and immediately lowered, and at the same time a gun is fired, it is a signal for vessels to make the best of their way to sea, to avoid being embayed, and that they may return at a more convenient opportunity. When the sea is smooth and the wind fair the red flag is hoisted at low water as a call for vessels to approach and keep near the bar; the flag is then lowered, and when the tide is high enough to allow vessels to enter it is hoisted again. If a gun be fired and the flag remain hoisted, it is a signal for vessels to make more sail in order to save the tide.

Pilots are always ready to go off, but it sometimes happens that the sea is too heavy for boats to cross the bar, when vessels can. In this case the pilot boats remain inside the bar, and a pilot stationed at the tower, who will signalize in conformity with the boats.

Tides.—It is high water, full and change, at the bar of Aveiro at 3h., and the rise is 7 to 8 feet; but at the town of Aveiro the rise is scarcely $4\frac{1}{2}$ feet.

Mira.—The lagoon and town of Mira are 10 miles to the south-west of the bar of Aveiro. There are a few huts built on the beach abreast the town, which may be seen 6 miles off. A large portion of

the population of this place is composed of fishermen. The old entrance to the Vouga was over the bar of this lagoon.

The coast from the bar of Aveiro to cape Mondego continues low, forming an extensive waste of sand in places 4 miles wide, only interrupted by the houses of Mira and those of Tocha, which are $9\frac{1}{2}$ miles northward of the cape. Beyond this belt of sand the land is high, particularly the peak of Bussaco, which is about S.W. by W. 12 miles from that of Caramullo, and connected with it. Nearly E.S.E. from the peak of Bussaco are the Cantaros, or lofty peaks of the great chain of the Estrélla mountains, which are the highest in Portugal. The most elevated part, being 6,400 feet above the level of the sea, is 56 miles inland, and visible from seaward in clear weather at a distance of 36 miles from the coast.

CAUTION.—This coast, between Aveiro bar and cape Mondego, is more dangerous than it is generally understood to be. At some distance from the sandy beach banks of sand are said to form at intervals at some distance from the shore, caused by the influence of the winds or currents. These banks are not stationary, but disperse and re-form at other points, and vessels coasting have been known to ground on them. Mariners are therefore recommended to keep at a distance of 3 or 4 miles from the coast, until they are to the southward of cape Mondego, when bound to Figueria.

CAPE MONDEGO is the western termination of mount Buarcos, which has a signal house standing on its level summit, 830 feet high, and can be seen about 30 miles off; the mount at a distance has the appearance of an island, and must not be mistaken for the Burling island. The cape itself is a sandy point, with a reef extending over a cable to the south-west, and the sandy beach extends several miles both north and south, by which it may be known. On the south side, $1\frac{1}{2}$ miles from the cape, is the small fishing village of Buarcos, whence boats go off to vessels with pilots for Figueira harbour, but they are frequently prevented from getting off by the heavy surf on the beach.

There is good anchorage for vessels off the village with north and off-shore winds.

At about 3 miles S.S.E. from cape Mondego is fort Santa Catherina, on the northern point of the entrance to the river Mondego. The soundings abreast of and near to the cape are 7 fathoms, a little farther off 20, and at about 7 miles distance 30 fathoms, brown sand and shells.

Vessels standing off and on on account of weather should not come into less than 30 fathoms off the cape, or into 40 fathoms when to the northward of it.

LIGHTS.—On cape Mondego is an octagonal lighthouse, which exhibits, at an elevation of 302 feet above the sea, a *fixed white* light, visible from a distance of 20 miles.

At fort Santa Catherina, on the north side of the entrance to the river Mondego, is exhibited, at an elevation of 36 feet above high water, a *fixed white* light, visible in clear weather from a distance of 11 miles, through an arc of 270° , or between S. $16\frac{1}{2}^{\circ}$ W., through east, and N. $73\frac{1}{2}^{\circ}$ W.

At Buarcos there are two small *red* leading lights to mark the channel for fishing vessels.

The RIVER MONDEGO has its source in the mountains of Estrélla, and after a course of about 90 miles forms the harbour of Figueira, and falls into the sea at the town of this name, which is on the north bank, a third of a mile from its mouth, where a trade is carried on in salt, oil, wine, dried and other fruits.

The harbour formed within the mouth of the river would be spacious, but it is nearly filled with flats of shifting sand, and its entrance is very narrow. The bar frequently shifts, and has sometimes as much as 11 feet over it at low water, but at other times it is so shallow that the smallest vessels cannot cross; generally, however, there are 5 or 6 feet over it at low-water springs.*

Pilots.—From the strength of the tides and the uncertain state of the bar, pilots are necessary, and when they cannot get out, a red flag is hoisted at fort Santa Catherina, north of the bar.

Bar signals.—If the flag just mentioned is afterwards lowered or struck, it shows that the tide is not sufficiently made, and that vessels are to keep at a prudent distance till the flag is again hoisted. When a gun is fired without the flag being hoisted, it is a signal for vessels to make the best of their way to sea, in order not to be embayed, and to return at a more convenient opportunity. If a gun be fired with the flag hoisted, the vessel should make more sail to save the tide. On approaching the bar great attention should be paid to the signals from the fort and pilot boat, which are made by a staff with a small flag attached to it. When the staff is pointed to the north or south the vessel should steer in the direction indicated; but if held upright, keep on the same course.

Dock.—Biera Alta, Pontoon, 180 feet over all, and 15 feet width of entrance.

* See Admiralty plan, port Figueira, on chart Cape Finisterre to Cape St. Vincent, No. 87.

Tides.—It is high water, full and change, at Figueira bar at 2h. 30m., and the rise is about 7 feet.

Anchorage will be found with off-shore winds at about 5 miles southward of cape Mondego, in from 10 to 7 fathoms water, sandy bottom; but should the wind veer to southward, vessels should weigh immediately and stand out to sea, for westerly gales generally commence from the southward, send in a heavy sea, and are frequently of long duration.

Coast.—From Figueira the coast trends to the south-west for 16 miles to the river Vieira, and 18 miles farther on is the church of Nazareth, at the north point of the small bay of Pederneira. The shore is a long flat, composed almost entirely of sand, but rises in the interior to hills of a moderate height. This level coast is covered here and there with woods of fir and larch trees, the most extensive of which are the Leiria and Concelho, together occupying an extent of 13 by about 27 miles. In fine weather, with off-shore winds, small vessels anchor off Vieira river, or near the chapel of San Pedro de Muel, in from 8 to 10 fathoms water, sandy bottom, at about a quarter of a mile from the beach.

On the shore between Figueira and the river Vieira there is no remarkable object, except three small sand-hills. The forests are not visible more than 4 or 5 miles from the coast, from which they are separated by extensive sandy plains. The north point of Pederneira bay, formed by a rocky headland, which is considerably elevated above the flat sandy coast, is abrupt, and projects one mile in a south-west direction. There is a fort on its outer point, and on its summit the church of Nazareth, the high and pointed spire of which is an excellent mark for the place. No other edifice on the coast can be mistaken for this church, which is surrounded by a number of houses, appearing like a village, but they cannot be seen from a great distance. There is a grove of pines to the north-west of the headland, planted to protect the church and houses from the shifting sands.

The small vessels which anchor in Pederneira bay are sheltered from easterly winds, but exposed to all other winds. The town of this name is partly on a hill connected with the height of Nazareth, about a mile to the south-east of the church, and the same distance from the beach. The population are principally employed in fishing.

From Pederneira the coast is of steep cliffs as far as lake Obidos, about 12 miles to the S.W. by W. These cliffs are backed by the hills of Boiro, which terminate in a headland named Foz, near the mouth of the lake.

San Martinho bay.—About 6 miles south-west of Nazareth church is the small bay of San Martinho (St. Martin), where small vessels load with wood, it may be recognized in the day time by the cliffs of the Alto do Facho, on the north-west side of the harbour, which attain an altitude of about 500 feet, and by the lighthouse on Santo Antonio point. The coast extending to the south-west for about half a mile from the southern point of entrance, should be given a wide berth, for the rocks which have fallen from the cliffs form dangerous reefs, on which the sea breaks even in fine weather. There is said to be only 5 feet, or even less, over the bar at low-water springs, and in heavy weather the sea breaks over the whole of it, so that even boats cannot cross. The harbour is fast filling up with sand, and in its present condition can only be used by small coasting vessels ; the holding ground is bad.

Provisions are scarce and expensive ; water can be obtained rather slowly from a fountain near the custom house, but the river water is brackish.

A railway is in course of construction (1887), and the company are in possession of a considerable quantity of coal, which might possibly be purchased in small quantities.

The town is on the north shore of the bay, and is in telegraphic communication with Lisbon ; the office is near the railway station.

Lake Obidos is about 8 miles in circumference, and communicates with the sea by a small outlet not more than 40 or 50 yards wide, which is choked up in summer. It abounds with excellent fish, which give constant employment to a large number of boats from the different establishments on its banks.

LIGHT.—A *fixed white* light is exhibited from the lighthouse on Santo Antonio point, situated about $1\frac{3}{4}$ miles from the village of San Martinho do Porto, at an elevation of 100 feet above high water, and should be visible in clear weather from a distance of 11 miles.

Pilots.—There are two or three pilots, who only go out when a vessel is expected ; the pilotage charges are 30 francs for either entering or leaving the bay.

The **PENINSULA of PENICHE** is a rocky surface of about 5 miles in circumference ; it is steep, projects seaward, and is connected with the main by a sandy isthmus a mile in length, which is completely overflowed by high tides, in strong winds, either from the northward or southward. A line of fortifications extends along the south-east face of the peninsula ; at the north end of it is the

upper town of Peniche, and at the south end the lower town, near which is the citadel. A sandy shore with downs extends westward to cape Carvoeiro, the outer point of the peninsula of Peniche. A lighthouse stands on cape Carvoeiro, and near it is a battery and chapel. Close off the cape is a detached rock named Nau.*

LIGHTS.—From the lighthouse on cape Carvoeiro is exhibited, at an elevation of 180 feet above high water, a *fixed red* light, visible in clear weather through an arc of 288° , or between the bearings of N. 36° W. and S. 72° W., from a distance of 17 miles. During thick or foggy weather a fog trumpet is sounded for a period of *eight to ten seconds*, with intervals of *thirty seconds* of silence.†

A *fixed red* light is exhibited, at an elevation of about 33 feet above high water, from fort Cabanas, Sul bay, on the southern shore of the peninsula of Peniche. The light is visible through an arc of 120° , and should be seen in clear weather from a distance of 7 miles.

Semaphore.—At cape Carvoeiro there is a semaphore station, with which vessels can communicate by the International code. (*See Meteorological signals*, page 7.)

The anchorage in the bay on the north of the isthmus, between point Baleal and upper Peniche, is not good, and all winds having northing in them send in a heavy sea.‡ But the bay on the south side of the isthmus between the lower town and the rocky point at Consolation fort, affords shelter, with winds from east to north, and even as far round as N.W., in 6 and 7 fathoms water; the bottom however, is for the most part rocky. If using this anchorage be careful to anchor as soon as the arch of the bridge between the fortifications, and an isolated rock to the east, begins to open. Small vessels can enter the ditch of the fortifications from the southward at high water, and haul up on the shore.

* *See Admiralty plan*:—Peninsula of Peniche, Burling and Farilhões islands, and anchorage on the east side of Burling island, on chart Cape Finisterre to Cape St. Vincent, No. 87.

A telegraphic cable station—Falmouth and Lisbon—is established at Peniche for reporting the passage of vessels.

† Information has been received that this *red* light is a temporary light, and will be replaced by a *flashing white* light, the date of exhibition of which is, however, unknown.

‡ In March, 1888, H.M.S. *Stork*, Lieut. T. F. Pullen, found anchorage here in $9\frac{1}{2}$ fathoms, coarse sand, and good holding ground, with Sul light bearing S.W., and extreme of Punta da Papôa W. by N. $\frac{1}{4}$ N. There was a fresh S.W. wind at the time, and a heavy break on the weather shores of the bay, caused by the north-westerly rollers that were setting in; these rollers are the danger of the bay should the wind haul round to the west.

Tides.—It is high water, full and change, at Peniche at 1h. 54m.

CAUTION.—In thick weather the peninsula of Peniche appears like an island, and has been mistaken for the Burling, whereby vessels have been wrecked on the isthmus ; such a mistake may, however, be avoided by remembering that when the Burling island is seen, so also will be the Farilhões, which are 4 miles to the north of it, and also that the breadth of the passage between the Burling and the peninsula is much greater than the apparent opening to the eastward of the peninsula can appear under any circumstances. Besides which, the position and height of the lighthouses should be considered; that of Carvoeiro is on the extremity of the cape, and its base about 90 feet above the sea, whilst the base of the Burling is higher, being about 288 feet above the sea.

BURLING or BERLENGA ISLAND, of an irregular oblong form, and about three-quarters of a mile in length in an E.N.E. and W.S.W. direction, is level on the summit, and bounded for the most part by perpendicular cliffs. An isthmus, about 140 yards across, divides it into two unequal parts, between which two small, narrow inlets are formed ; the northern one, named Carreiro dos Cações (Frying-pan road), is bounded by high and almost perpendicular cliffs. This inlet has a depth of 5 fathoms at its entrance and 3 fathoms close to the isthmus, against which the sea breaks with great violence during westerly winds.

The south-east inlet, named Carreiro do Mosteiro (Monastery road) has 8 fathoms at its entrance, diminishing to 2 fathoms close to the beach, where landing is easy. On an islet to the south-west of the inlet is a small fort connected to the island by a bridge, from which a road leads to its summit ; boats land at the north part of this islet in fine weather. There are two small springs of fresh water on the island. Vessels may anchor abreast of the fort in from 12 to 15 fathoms, sand, but only with winds between N.W. and S.W.

A small detached high rock lies close to the north-east end of the island, and near it a rocky shoal occasionally shows. Also, a rock which uncovers at low tide lies about a cable off the south end of the island. The lighthouse, standing on the highest part of the island, bears N.W. by N., $5\frac{1}{4}$ miles from the lighthouse on cape Carvoeiro. (See pages 13—15 for Currents and Caution.)

LIGHT.—The lighthouse on Burling island is square, and exhibits, at an elevation of 365 feet above the level of high water, a *revolving white* light, attaining its greatest brilliancy every *three minutes*, and should be seen in clear weather from a distance of 25 miles.

The **ESTÉLLAS**, a group of islets lying from half a mile to a mile north-west of Burling island, extend three-quarters of a mile W. by S. and E. by N. ; a rocky shoal near the western islet shows at low water. The channel separating these islets from Burling island is deep but dangerous, from the rapid currents, and its foul rocky bottom affords no anchorage.

The **FARILHÕES**, a cluster of rocky islets covering a circular space about three-quarters of a mile in diameter, are steep, and that called the great Farilhão rising to the height of 315 feet, bears N. $\frac{1}{2}$ W., $3\frac{3}{4}$ miles from Burling island. Some sunken rocks, which break at low water, extend $1\frac{1}{4}$ miles from the eastern side of great Farilhão, and there are some sunken rocks, which also break at low water, lying 6 cables from the western side of the island. Remela reef, with $4\frac{3}{4}$ fathoms over it, lies 4 cables off the north side of the island. A small bay formed by the large islet affords shelter to fishing boats in winds from N.N.E. round westward to W.S.W.

The strait between the Farilhões and the Estéllas is from 20 to 50 fathoms deep, and its navigable breadth $2\frac{1}{2}$ miles, but the current before spoken of sets strongly from the former to the latter, and renders great caution necessary ; also there should be wind enough to keep the vessel well under command when passing through it.

The channel between Burling island and the main is clear and deep ; at half a mile from the shore on either side there is a depth of 14 fathoms, increasing to 24 fathoms ; the bottom is rocky, with sand and gravel. Both the Farilhões and the Burling may be seen from the deck of a vessel at a distance of 24 miles, and the peninsula of Peniche at nearly the same distance ; all are easily distinguished, and too remarkable to be mistaken with common attention. This channel may be taken, therefore, without fear at any time when the above points are visible.

Caution is necessary in sailing along this part of the coast in thick weather, to avoid running on these isles, as they lie so far from the land and the depth around, and almost close to them, on every side is so great that the lead would hardly give warning in time to clear them.

The coast from cape Carvoeiro trends S.S.W. $\frac{1}{2}$ W. for about 35 miles to cape Roca. At Consolation fort, 4 miles from the former cape, the sandy beach terminates, and steep rocky cliffs, with some breaks in them, follow nearly to the town of Lourinha, where there is an extensive beach ; at the end of it the coast again becomes steep,

and continues so as far as Porto-novo or the small river Maceira. From this the Praia Formosa (beautiful beach), so called on account of its length, regularity, and cleanness, extends to the south-westward for 5 miles. The town of Vimeiro stands in a valley $1\frac{1}{2}$ miles inland of Porto-novo, at the foot of the hill of Valongo.

The Monte Junto, rising 14 miles inland, 2,185 feet high, may be seen 53 miles off, or 39 miles from the coast. Its summit is in the latitude of Vimeiro, and in the middle of the range of conspicuous mountains which have a direction somewhat parallel to the coast. From the Praia Formosa the coast is steep for 13 miles to Nabas point, on a height to the southward of which is the fishing town of Ericeira, and near the town is a small creek used by boats. From Ericeira to cape Roca the coast is steep and rocky, except a small place named Macaas, 3 miles from the cape, off which small coasting vessels occasionally anchor.

Mafra palace, built of a species of white marble, on the summit of a hill 4 miles East of Ericeira, contains a palace, convent, and superb church ; its front is 825 feet in length, the church being in the centre of the structure, having the palace on one side and the convent on the other. This magnificent building, having no other like it on the coast, is remarkable and conspicuous.

The **CINTRA MOUNTAINS**, rising a little south of cape Roca, extend 5 miles in an easterly direction, the summit presenting an irregular and rugged outline. At each extreme is a convent ; that at the eastern end is named Pena, and that at the western Peninha.

They are visible from a great distance, the former being 1,735 feet and the latter 1,617 feet above the sea. The town of Cintra, on the northern acclivity of the mountain, may also be seen from a long distance. Cintra convent is a most conspicuous object, and has been clearly distinguished from a distance of 42 miles.

CAPE ROCA (or Rock of Lisbon) is the westernmost point of Portugal, and of the continent of Europe. It is about 550 feet high, its cliffs are bluff and steep, and a lighthouse stands upon its summit. Near the cape is a high rock, and farther out a reef, on which the sea continually breaks ; close off this reef are 25 fathoms water. The bottom in the neighbourhood of cape Roca is irregular, there being 23 and 28 fathoms amongst depths of 65 and 75 fathoms. These shoal spots are met with about 12 miles to the north-west of the cape, and only a short distance within the 100-fathom line.

About 4 miles S. by W. from cape Roca is cape Razo, upon which is fort San Braz. This is a low rocky point, with a small shoal close off it, which it is necessary to avoid. Between these capes the coast forms a bay bounded by steep cliffs, till within a mile of cape Razo where there is a small beach.

Semaphore.—At Oitavos, about a mile south-east of cape Razo, is a semaphore station, with which vessels can communicate by the International code. (*See* Meteorological signals, page 7.)

From cape Razo the coast of steep cliffs trends to the south-eastward nearly $3\frac{1}{2}$ miles to fort Santa Martha, at the western extreme of Cascaes bay. Between these points are the chapel and light-tower of Guia; the latter is $1\frac{1}{2}$ miles from the west point of Cascaes bay.*

LIGHTS.—**Roca light.**—The circular light-tower on cape Roca, situate nearly a quarter of a mile N.E. of the cape, exhibits a *revolving* white light, which attains its greatest brilliancy every *one and three-quarter minutes*. It is elevated 596 feet above high water, and visible in clear weather from a distance of 21 miles.†

Guia light.—The hexagonal light-tower of Guia, situated $1\frac{1}{2}$ miles to the north-west of the west point of Cascaes bay, near the chapel of Guia, exhibits a *fixed white* light, at an elevation of 167 feet above high water, and should be seen in clear weather from a distance of 15 miles.

CASCAES BAY is formed by the shore from port Santa Martha sweeping to the north-east, east, and south-east to Rana point, one mile beyond which is fort San Julian, at the entrance to the Tagus. A sandy shore extends round the bay between fort Santa Martha and fort Velho for about $1\frac{1}{2}$ miles; thence it is rocky to Rana point, off which for 2 cables the ground is foul. The shore again becomes sandy to fort San Julian, midway between which and Rana point is a bank with $3\frac{1}{2}$ fathoms water over it, the outer edge being $3\frac{1}{2}$ cables from the shore, and very near the fairway of the North channel into the Tagus. The town of Cascaes stands on the shore, half a mile from fort Santa Martha, and between them is fort Cascaes, which is conspicuous on a high, steep point.

Anchorage.—There is good anchorage in Cascaes bay during the summer months, the wind being almost invariably from the north-

* *See* Admiralty plan :—Entrance of the river Tagus, with the harbour of Lisbon, No. 89; scale, $m = 1.7$ inches.

† This light was reported irregular in its action. *See* the Hague, Notice to Mariners, No. 40, 1885.

ward ; southerly winds throw in a heavy sea, when vessels should either put to sea or endeavour to stand through the North channel into the Tagus. Large vessels anchor in 7 to 10 fathoms, mud and sand, with Guia light-tower in line with the light-tower on Santa Martha fort. Small vessels lie farther in, and coasters close off the town.

LIGHT.—On fort Santa Martha, near the village of Cascaes (north side of entrance to river Tagus), is a square tower, with a blue horizontal stripe half way up from the base ; which exhibits, at an elevation of 52 feet above high water, a *fixed red* light, visible in clear weather from a distance of 5 miles.

Semaphore.—At Cascaes there is a semaphore station, with which vessels can communicate by the International code.

LISBON, the capital of Portugal, on the northern bank of the Tagus, is about 7 miles from its mouth. The broad estuary of the Tagus forms an extensive and safe harbour, in which the largest vessels can anchor close to the city, and is admirably adapted for commerce, both the north and south shores presenting a very pleasing prospect, from the numerous villages, buildings, gardens, and cultivated land.

The city rises from the bank of the river in the form of an amphitheatre, being built on a succession of hills, the highest of which is the Estrélla to the west, and the Castle hill on the east. Most of the streets are steep, irregular, badly paved, and dirty : one part of the town, however, is regular and handsome. This space contains 8 or 9 well built, parallel, and wide streets, and contains the best shops of the city : these are crossed at right angles by others, that terminate in a handsome square, the Prado de Commercio, one side of which is formed by the Tagus, and the others by the Arsenal, Custom House, Exchange, Royal Library, and other public buildings ; the whole presenting a magnificent aspect from the river.

A handsome stone quay extending the whole length of the town is planted with trees and lighted with gas, forming a most agreeable promenade in the hot summer evenings. The market is commodious and well supplied, and the hotels are numerous, comfortable, and moderate in price, but the cafés are not so good as those in Spain.

The Arsenal was formerly one of the finest establishments of the kind in Europe, but it is now, with the dockyard, on a reduced scale. A handsome aqueduct brings water into the city from the springs near Bellas, a distance of 10 miles ; this, as a work of art, is not

surpassed in boldness of design and grandeur of effect by any in Europe. The British Minister, in addition to a Consul and a Vice-consul, resides in Lisbon.

The climate is hot and dry in the summer months, when the thermometer often stands at 96° Fahrenheit. There is a species of remittent fever, known as Lisbon fever, which is endemic, but seldom proves fatal. Heavy rains fall in November and December. It is cold in January, but snow is of rare occurrence, and in February the spring begins.

Trade, &c.—There are manufactories of silks, paper, soap, leather, sugar refineries, and potteries; among the exports are wines, fruits, fish, and oil; the aggregate value of exports of national produce being a little under £3,000,000. The chief imports are cattle, wool, hides, silks &c.; and the aggregate value in 1889 was £9,302,272. Over 3,000 vessels of all nationalities enter the port annually, representing an aggregate tonnage of over 1,800,000 tons. There are no special custom-house or quarantine regulations, but all vessels in quarantine have to lie at the Lazaretto. There is steam communication to all the countries of Europe, Brazil, East and West coast of Africa, and the Pacific.

Lisbon is in telegraphic communication with the whole world; and there is railway communication with Paris, and thus with the whole Continent of Europe. Population in 1878 was 246,343.

Repair of vessels.—There are several large private founderies, engineers' shops and boiler makers' establishments, for repairs to machinery. By special permission from the Government repairs can be executed at the Arsenal.

The repairs to hull are executed in the private docks.

Supplies of all kinds are abundant and easily obtained.

Water.—There is probably no town in Europe better supplied with pure water than Lisbon. The aqueduct brings the water in from the neighbourhood of Bellas, and pours it into a large reservoir on the highest part of the town, from whence it is conveyed in pipes to innumerable fountains, locally called chafarizes. The water for shipping is brought from Cacilhas side, the tanks, which hold about 70 tons, being filled from a pipe about a mile below the point. It is however stated at times to contain organic matter, and in 1880 was pronounced unfit for drinking.

Coal.—A large quantity of coal is kept in store, and H.M. ships are supplied with the best South Wales steam coal by the Admiralty

contractor at 20s. 3d. per ton, delivered alongside. The average market price is 24 shillings a ton. Coaling is performed exclusively by means of large barges.

Hospitals, &c.—There are two hospitals, the British Royal Naval and Merchant Seaman's Hospitals, and a British Sailors' Home.

Docks.—The Government dry dock at Lisbon is $322\frac{3}{4}$ feet in length over all, and 56 feet breadth of entrance, with $25\frac{1}{2}$ feet over the sill at high water springs. This dock when not in use by National vessels is courteously placed at the disposal of Foreign ships of war.

There are three private docks at Cacilhas—two dry and one floating. The largest of the dry docks is 225 feet long over all, and 38 wide at the entrance, with a depth of 14 feet over the sill at high water springs; this dock has admitted a vessel of 1,200 tons. The smaller dry dock is 150 feet long over all, and 25 feet wide at the entrance, with $12\frac{1}{2}$ feet over the sill at high water springs; this dock has admitted a vessel of 450 tons. The floating dock is $155\frac{1}{2}$ feet in length over all, $39\frac{1}{2}$ feet wide at the entrance, with 16 feet over the sill at high water springs; the largest vessel which has been admitted was 800 tons. This dock is entered only at high water.

Harbour works.—Important docks, quays, and other harbour improvements are to be made during the next ten years at a cost of £2,400,000.

Time ball.—The time signal is made from the south-east angle of the Naval School, near the Marine observatory, of which the following are the particulars:—

The signal is a black ball $3\frac{1}{4}$ feet in diameter, which is hoisted half-mast as preparatory 5 minutes before signal, close up at 3 minutes before, and dropped at 1h. 0m. 0s. p.m. mean time at the Royal Astronomical observatory of Lisbon—equivalent to 1h. 36m. 44.7s. Greenwich mean time.

The fall of the ball is effected automatically, from the Royal Astronomical observatory of Lisbon, by means of electricity. The instant at which the fall takes place will be registered chronographically, in order that the correction to be applied each day may be accurately known. These corrections will be published by the observatory in the *Folha Oficial* with the least possible delay.

Should the signal fail in accuracy, the fact will be indicated by the ball rising very slowly half-mast high, remaining in that position until 1h. 7m., when it will be hoisted close up a second time, and dropped at 1h. 10m. 0s. This extra signal is not repeated if from

any cause it should again fail in accuracy. To indicate the second failure, the ball is hoisted very slowly half-mast high, where it remains for 5 minutes and is then slowly lowered.

When, owing to bad weather, or other circumstance, the ball will not act, the fact is indicated by a red cylinder, 16 inches in length and of equal diameter, being hoisted at 0h. 50m., on an arm of the signal staff, and left there until 1h. 5m. p.m.

Telegraph cables.—There are two submarine cables to England, one to Vigo, two to Madeira, and two to Gibraltar.

The RIVER TAGUS, or Tajo of the Portuguese, is navigable for all classes of vessels from its entrance to the city of Lisbon, a distance of about 7 miles.

Here there is anchorage off the Packet stairs in 10 to 14 fathoms water, or further up in 12 to 16 fathoms mud.

Above Lisbon, the Tagus opens out into a wide expanse of water from 2 to 7 miles in breadth, and here any number of ships may be accommodated in a convenient depth of water, and although hitherto beyond the city the river has not been of much commercial importance, it is navigable for vessels of 150 tons, as high as the mouth of the Zezere.

Opposite Lisbon, on the south shore, is Cacilhas point, being the eastern point of what may be termed the port of Lisbon, and from whence the wide expanse already alluded to opens out; here the river is a long mile wide, but it narrows to about 9 cables at Belem, when it becomes considerably wider, and at its entrance it is $1\frac{1}{4}$ miles across.

Belem castle, on the north side of the Tagus, 5 miles above fort San Julian, and about 3 miles below Lisbon, is a prominent feature in entering the river, as it stands on a projecting point, and is nearly insulated at high water; near it is the quarantine station. Here the health and customs offices are established, and off it all vessels are boarded on entering. The church, houses, and straggling quintas of Belem almost connect it with the capital.

CACHOPO or CACHOP SHOALS.—Off both points of the entrance to the Tagus there are dangerous sandy shoals extending in a westerly direction, and having between them a deep channel, which is nowhere less (between the 5-fathom lines of soundings) than nine-tenths of a mile in breadth. These shoals are named the North and South Cachopo.

From the depth of $4\frac{1}{4}$ fathoms, at the west end of the North Cachopo, the lighthouse on fort San Julian bears E.N.E., distant nearly $3\frac{1}{2}$ miles. Thence the shoal, with $2\frac{1}{2}$ to three-quarters of a fathom water over it, extends in the direction of the fort, leaving at its east end a narrow passage into the Tagus, called the North channel.

From the south-east point of entrance to the Tagus, the South Cachopo, or Alpeidão, extends to the West and W.S.W. for $2\frac{1}{2}$ miles. From the depth of 4 fathoms, at the west end of the shoal, Bugio fort bears N.E. by E. $\frac{1}{2}$ E., distant nearly $1\frac{1}{4}$ miles. The larger portion of this shoal has little more than one fathom water over it, and around Bugio fort the sand is dry at low water.

The BAR, between the western extremes of the Cachopos, has 6 and 7 fathoms over it at low-water springs; the channel within it soon deepens to 9 fathoms, increasing to 19 and 20 fathoms, abreast Bugio fort, but there is a depth of 9 fathoms W.N.W., nearly 9 cables from the fort. Notwithstanding the depth upon the bar, and the distance between the extremes of the Cachopos, the sea in south-west gales rolls over it with great force, frequently forming one tremendous roller that breaks with irresistible violence the whole distance across; at such times the bar is impracticable, and in winter, or when the freshets are strong and accompanied with westerly gales, continues so for several days together.

LIGHTS.—St. Julian light.—From a tower in fort San Julian, at the north point of entrance to the Tagus, a *fixed white* light is exhibited at an elevation of 128 feet above high water, and visible in clear weather from a distance of 13 miles.

Bugio light.—A round tower in Bugio fort exhibits at 110 feet above high water, a *revolving white* light, attaining its greatest brilliancy every *three minutes*, and should be visible in clear weather from a distance of 16 miles.

Leading lights.—At $2\frac{1}{2}$ miles west of Belem Castle two *fixed red* lights 470 yards apart N.E. by E. $\frac{3}{4}$ E. and S.W. by W. $\frac{3}{4}$ W. from each other, are exhibited for leading over the bar of the river Tagus. The high light which is shown from an octagonal stone tower, with cupola of lantern painted red, situated on Alto de Caixas, is elevated 310 feet above high water, and should be visible in clear weather from a distance of 18 miles.

The low light, elevated 60 feet above high water, is shown from a tower painted red with a white roof, at Porto Côvo, and should be visible in clear weather from a distance of 10 miles.

Belem light.—From the lower platform of the tower of Belem castle, a *fixed red* light is shown at an elevation of 44 feet, and visible in clear weather 7 miles. The light is obscured northward of the bearing S. 75° E.

Cacilhas point light.—A *fixed white* light, 46 feet above high water, is exhibited from the lighthouse at Cacilhas point, on the south shore of the river, and should be seen in clear weather from a distance of 11 miles; the light is obscured southward of S. 76¼° E. (this line indicating the direction of fort St. Julian light). The lighthouse is built of iron, and is red in colour.

During thick and foggy weather a bell is sounded every five seconds.

Semaphore.—There is a semaphore station at fort San Julian, with which vessels can communicate by the International code.

Tides.—It is high water, full and change, at Belem, at 2h. 30m.; springs rise 12 feet, and neaps 9 feet. The great danger in entering the Tagus is occasioned by the tides. Off the city of Lisbon the ebb sometimes runs at the rate of 6 or 7 miles an hour, particularly when the freshes come down after rain, so that anchors frequently come home. The flood is commonly much weaker than the ebb. When a strong ebb is opposed by a gale from seaward, the sea breaks completely across the bar, so that the breakers cannot be distinguished from those on the Cachopos. In the South channel the current sets directly through, and over the bar on the flood 3 miles an hour, and on the ebb 4 miles an hour. Therefore, to enter during the ebb requires a strong breeze and the vessel well under command.

Within the river, the wind, unless it is west or south-westerly, comes irregularly through the valleys on either side. It is, however, pretty steady when it blows in the direction of the river. It is also to be remarked that the tide draws strongly towards the Bugio bank, and divides the water in that vicinity into several counter currents, so that a vessel approaching too near that bank is liable not to obey the helm.*

* "During our stay here we have experienced very strong freshes down the river running 5 to 7·8 knots, the ebb anchor coming home every time, even with 9 shackles of cable. Many merchant ships have also parted their cables. Lines of mooring buoys now laid down from the Custom-house to the Packet Stairs, prevents ships getting in so close as formerly. On the 29th December we shifted berth to the opposite shore, under Cacilhas point, here we found the ebb tide much steadier and not so strong, 3 knots being the maximum recorded strength."—Staff-Commander A. J. N. Neville, H.M.S. *Minotaur*, December 1886.

"A decided benefit was felt by being on the south-shore side of the river during the spring tides, which though strong were far less violent during the freshets, than those experienced on the north side." Staff-Commander B. Gwynne, H.M.S. *Monarch*, January 1888.

Pilots are usually to be found some distance from the entrance of the Tagus ; their boats are to be distinguished from others by a blue flag hoisted at the yard-arm of their lateen sails. There are also some pilot schooners with letter **P** on the mainsail ; pilots may always be obtained at Cascaes.

LEADING MARKS.—Santa Martha fort, to the southward of Cascaes, is white and of a triangular form to the eastward, with a low battery extending to the northward, and on its south-east angle is a square light-tower, with a blue horizontal stripe, half-way up from the base ; Guia lighthouse, in line with the bastion of this light-tower bearing N.W. $\frac{3}{4}$ W., leads through the North channel.

Cascaes fort is large and conspicuous, and stands to the north-east between Santa Martha and the town of Cascaes, the outer northern wall extending to the town.

Fort San Julian is an extensive fortification erected on a high steep point on the north-west side of the entrance to the Tagus. A ledge of rocks with 3 fathoms over it extends a short distance to the south-eastward of the fort. (*See foot note, page 363.*)

Bugio fort stands upon the highest part of the South Cachopo, about a mile from Calha point, the south-east point of the mouth of the Tagus ; the fort is of a circular form, and the sand around it is dry at low water.

The Paps are very difficult to be distinguished, particularly on the bearing used for the South channel, from whence they appear over some flat ground which scarcely shows above the land to the south-west of it ; they lie to the eastward of a ridge of hills with several windmills. When seen to the northward of San Julian, or to the southward of the Bugio, they show like two small hummocks, but when in a line with either of the turning marks, or with the leading mark, they appear as a single hummock with a flat top.*

The Mirante or Turret of Caxias is a small white dilapidated building, formed of two octagonal turrets, with red cupolas, on a hill a little over 3 miles E. by N. of San Julian fort, and is used as the northern turning mark for the South channel when in one with the Paps bearing about E. by N. $\frac{3}{4}$ N.

Porto Covo.—The lighthouse at Porto Covo does not stand out very well from the cliffs in the day time when on the line of bearing

with Caxias lighthouse, but a large red one-storied house, situated on the river bank, westward of and quite close to the lighthouse, is a great help in finding it from a distance.

Jacob's ladder is a range of white masonry or stone wall that supports the cliff, and it is not easily distinguished ; it is between two conspicuous white buildings, and there is a stone wall resembling an aqueduct to the eastward of it, and another to the westward. Jacob's ladder is used as the centre leading mark for the South channel when brought in line with the Paps, bearing E.N.E. A large conspicuous cypress tree stands a third of a mile to the eastward of Jacob's ladder, and when in line with the Paps, bearing E.N.E. northerly, is used as the southern turning mark for the South channel. This tree is above, and a little westward of the Boaviagem convent, a long regular white building with numerous windows.

The tower of Belem is an ancient building 92 feet high, and formed of three distinct parts, with a battery just above water ; it is about $5\frac{1}{4}$ miles from San Julian, and at high water is nearly insulated. It stands on the extremity of the point, from which the coast bank extends along shore to the westward, and appears to be increasing. To guard vessels from this danger at night, the *fixed red* light at Belem castle is obscured northward of the bearing S. 75° E.

The dome of Estrella is an excellent mark and readily distinguished by its great size, being the largest dome in Lisbon, and towering above all other buildings in the city ; when in line with Bugio fort it bears E. $\frac{1}{2}$ N.

Beacons.—There are three beacons, painted in red and white bands, with red bases, which in line indicate the fairway of the South channel, Tagus river entrance. The southernmost beacon, Gibalta, is on Jacob's ladder ; the middle beacon, Esterio, is nearly 4 cables to the E.N.E. of Gibalta beacon ; and the inner beacon, which is much larger than the others, on the Paps. Boaviagem beacon with red arch, white base and tower stands a short distance north-east of Boaviagem convent, and when in line with the Paps beacon, bearing N.E. by E. $\frac{3}{4}$ E., passes very close to the northern edge of south Cachopo.

Buoys.—There are several large mooring buoys off the city, in about 13 fathoms water, in a line from a little above Packet stairs to off Caes do Sodre.

Caution.—To afford protection to a submarine telegraph cable crossing the river Tagus, vessels are prohibited from anchoring within the space enclosed by lines drawn between Ponte d'Argés and Trafaria

on the west, and between the Lazaretto and the telegraph station at Bom Successo on the east.

Also, that should a vessel, from any cause, anchor within this prohibited space, the anchor is not to be lifted without an express order, to be obtained from the office of the Captain of the port.

DIRECTIONS.—In steering for cape Roca, commonly called the rock of Lisbon, it should be borne in mind that with northerly winds, the current has a general southerly trend, varying between S.W. and S.E. at the rate of half, or a mile an hour. The soundings from Burling island to the southward are regular; a depth of 40 fathoms will insure an offing of about 10 miles until near cape Roca, when with the exception of two shoal spots of 23 and 28 fathoms, a greater depth will be found at that distance.

At night in clear weather, the light on the cape will be seen, having passed which, the Guia light will soon be observed, vessels should then keep off the coast sufficiently to open out Cascaes *red* light; thus avoiding the rocks of Pombeira, Nau, and Ponta da Insua.

The North channel into the Tagus requires a knowledge of the tides, and in a sailing vessel a commanding breeze. Having passed Guia and Cascaes, bring Cacilhas point (the eastern termination of the south shore) in line with the southern face of fort San Julian, bearing E. by S. $\frac{1}{4}$ S.,—or, if wishing to borrow on the North Cachopo, Belem tower in line with the south-east extreme of San Julian point;—steer in with either of the above marks until Guia lighthouse is in line with the light-tower on Santa Martha fort, N.W. $\frac{3}{4}$ W.; then keep this latter mark on, and it will lead in mid-channel, and in not less than $5\frac{1}{2}$ fathoms at low water.

When the centre of mount Cordova (on the south shore) is in line with Bugio tower, bearing about S.E. $\frac{1}{4}$ S., steer for Bugio until San Thomas fort (which is white and a long half mile north-east of San Julian) is seen open eastward of the yellow fort of Catalazete; then steer into the river carefully allowing for the tides, as the flood sets strong towards the shoal extending to the south-east from San Julian, while the ebb sets directly on the North Cachopo.*

Mount Cordova is 12 miles from San Julian fort, and may not be visible; in this case having entered the North channel, as soon as

* The rocky ledge of San Julian fort extends 90 yards from its south point where a depth of 3 fathoms will be found at low water, but in approaching it great caution is necessary, as the flood sweeps over it with great velocity.—J. Richards, Master of H.M.S. *Hecate*, 1851. In June 1872 the steamer *Gibraltar* was wrecked close to San Julian fort.

the rocks at Catalazete point are open of the south-east angle of fort San Julian, steer for Bugio fort till the battery at Catalazete point, San Thomas fort (the next to it), and the outer windmill, are in line bearing N.E. by E., and then haul more to the eastward into the river. Rana church in line with Quinta Nova is a good mark to check a vessel's position when proceeding through the North channel, with Cacilhas point in line with the southern face of fort San Julian, for she will then be in the centre of the fairway, and have Guia lighthouse just open south of the light-tower on Santa Martha fort.

The South channel is the principal passage into the river. On entering it with a fair wind, and rounding the southern extremity of the north Cachopo, keep the Peninha (or western part of the mountains of Cintra) bearing N. $\frac{1}{4}$ E., and open westward of Cascaes fort, until Bugio fort comes in line with the Estrélla dome, E. $\frac{1}{2}$ N. Then steer towards Bugio, keeping it in line with the Estrélla dome, which leads over the bar connecting the north and south Cachopos, in the deepest water, (not less than $6\frac{1}{2}$ fathoms); and when the Paps are in line with Jacob's Ladder, or the three beacons are in line (page 362), E.N.E., a vessel will be inside the bar, and the depth of water will have increased to 12 and 13 fathoms. Steer with the Paps in line with Jacob's Ladder, or if the wind be from the northward, borrow as far as the northern turning mark (the Paps in one with Caxias, E. by N. $\frac{3}{4}$ N.). On the contrary, if the wind be from the south-east, borrow towards the southern turning mark, with the Paps in line with the cypress tree, bearing E.N.E. northerly, but avoid going too near Bugio, as the tides there are strong and irregular, and the South Cachopo steep-to.

Having passed between Bugio and San Julian, keep to the northward, so as to clear the sandy flat inside Bugio, till Belem castle is in line with the south part of the city of Lisbon, bearing E. $\frac{1}{2}$ S. Pass Belem castle at the distance of 2 or 3 cables, and then proceed to the anchorage, keeping the whole of fort San Julian and all its outworks open to the southward of the parapet of Belem castle, which will clear the shoals of Alcantara, until the vessel arrives off the Packet Stairs, where there is anchorage in from 10 to 14 fathoms water, or farther up in 12 to 16 fathoms mud.*

At night, vessels should cross Tagus river bar with the leading lights in line, bearing N.E. by E. $\frac{3}{4}$ E., until Cacilhas point light

* See foot-note, page 360.

is seen, when the course should be altered for the fairway of the river, indicated by the northern limit of Belem light and the southern limit of Cacilhas point light, and having passed Belem castle, anchorage may be taken up as convenient.*

Turning through the South channel.—A vessel from the north-west standing towards the west tail of the North Cachopo, should keep Peninha peak, bearing N. $\frac{1}{4}$ E., open westward of Cascaes fort, and in not less than 12 fathoms water, until the south part of the city of Lisbon is in line with Bugio fort, bearing East, northerly; then haul to the wind. The turning mark for the north side of the channel is the Paps in line with the Mirante or Turret of Caxias E. by N. $\frac{3}{4}$ N.; and the Paps in line with the cypress tree (which stands a little above the convent of Boaviagem and a third of a mile eastward of Jacob's Ladder); E.N.E. northerly leads just clear of the breakers fringing the edge of the shoal.

Vessels working in or out should in approaching South Cachopo shoal tack directly the Paps come in line with Jacob's Ladder E.N.E.

The flood and ebb tides set strongly towards the north point of South Cachopo shoal, and must therefore be guarded against.

Rana church open westward of Quinta, bearing N. by E., just clears the tail of the South Cachopo, and in working in, a vessel need not go to the eastward of this line until well in the channel. A mill on a height $1\frac{1}{2}$ miles north-eastward of fort San Julian, open eastward of fort San Thomas, N.E. by E., clears the eastern edge of the North Cachopo, and this is a good fairway mark in running out through the South channel. The shallow ground around San Julian extends a short distance from the fort, but deepens immediately to 5 and 6 fathoms; San Thomas fort well open east of the small battery of Catalazete, on the intermediate point, clears the south extremity of this shoal.

Having passed forts San Julian and Bugio, stand to either shore into 12 fathoms; a good mark for clearing the shoulder of the sands, inside of Bugio, is Belem castle in line with the citadel of Lisbon, which stands on the first rise of the land from the south point of the city. Between Calha point and the village of Trafaria, the south shore is bordered by Trafaria bank, which extends fully a third of a mile from the shore, with deep water close to it.† The houses at

* H.M.S. *Monarch*, in March 1888, having crossed the bar at the last of the ebb wide, anchored in Paco d'Arcos bay for the night. In this bay the ebb tide runs for two hours after low water.

† There is a large red spherical buoy off Trafaria bank.

Torre Velha open north of Trafaria cliffs, clears the bank. Above Trafaria the south shore of the river is clear, with deep water as far as Cacilhas point.

Between fort San Julian and Belem castle the north shore is bordered for a short distance by a narrow bank, but westward of the castle it extends a quarter of a mile off. The shore on the south side of Belem castle is steep; thence it is again bordered by a bank which in places extends nearly 2 cables off, with 5 fathoms on its edge, and deep water close-to.

When nearing the Alcantara bank the mark for clearing it in 7 fathoms is San Julian castle and outworks open of the parapet of Belem castle, until Alcantara, which appears like the angle of a fort with a watch-tower, bears N. $\frac{1}{4}$ W. The bank will then be passed, and the shore may be approached until the tower of San Julian is in line with the parapet of Belem castle; and this is a good mark for anchoring, in 7 or 8 fathoms water, off the Packet stairs. A vessel of heavy draught will be far enough out in 12 or 14 fathoms, good holding ground of stiff mud, and out of the strength of the tides.

At Night.—If coming from the northward, bring Guia *fixed white* light to bear North, and steer on that bearing until Bugio *revolving* light bears East; then steer for Bugio on this latter bearing until San Julian *fixed white* light bears N.E.; when an E.N.E. course will lead between the two lights. When Cacilhas point light is seen, course should be altered for the fairway of the river, indicated by the northern limit of Belem light, and the southern limit of Cacilhas point light; and having passed Belem castle, anchorage may be taken up as convenient.

In entering from the southward bring San Julian light to bear N.E., and steer on that bearing until Bugio light bears East; then proceed as directed before. San Julian light N.N.E. clears the South Cachopo in 5 fathoms, and 4 cables from the depth of $2\frac{3}{4}$ fathoms.

When cape Roca light is shut in with Guia a vessel will be nearing the shoals, and within the influence of the river tides, and therefore a cautious and constant reference to the bearings will be necessary. Should the ebb tide be running, be careful not to be set too near Bugio; and if in any doubt, steer more to the northward.

CAPE ESPICHEL.—From Bugio fort the land trends in a southerly direction with a sandy beach to within 2 miles of cape

Espichel, when it becomes rocky, steep, and high to the cape, which is about 15 miles from Bugio.

The sounding between Bugio and the cape are very irregular, there being 20 fathoms 5 miles south-west of Bugio, and 256 fathoms about the same distance north of Espichel; the water being shoaler, generally, in the neighbourhood of Bugio.

About 6 miles northward of the cape is the lake of Albufeira, the mouth of which is closed at times.

Cape Espichel is a steep, bold headland, over 500 feet high, presenting a bluff to the W.S.W. about a mile in extent; its summit is level, of a whitish colour on the north side, and reddish on the south; and on it is a convent and a lighthouse. From the cape the coast trends suddenly to the eastward for 14 miles to the entrance of the port of Setubal or St. Ubes, then southward for 27 miles to the small river André, and then S.W. by W. $\frac{1}{2}$ W. 6 miles to cape Sines, forming a deep bight between the latter and cape Espichel.

The land on the north side of this bight is remarkable, not only for the sudden turn in the coast to the eastward at cape Espichel, but also for the mountains in its neighbourhood, the highest of which, the peak of Formozinyo, is 1,637 feet above the level of the sea, and visible 46 miles off. This peak is about 11 miles eastward of cape Espichel, and $1\frac{1}{2}$ miles from the peak of Arrabida. The mountain is $4\frac{1}{2}$ miles long in an east and west direction, so that when seen from the northward or southward it seems of considerable extent, but from the westward it appears isolated.

At $3\frac{1}{2}$ miles to the north-east of Formozinyo mountain is the Serra de San Luiz or mount Cordova, the leading mark for the North channel into the Tagus. It is 1,190 feet high, round, and resembling a haystack; and $2\frac{1}{4}$ miles N.E. by E. $\frac{1}{2}$ E. from it is the castle and town of Palmella, which, being isolated and built on an elevation of 882 feet, may be seen a considerable distance. The mountains of Arrabida, San Luiz, and Palmella form a triple range of land clearly distinguishable, and when seen at a great distance from the south-west are good marks for cape Espichel.

Anchorage.—In case of necessity, and with northerly winds, there are two anchorages under the land between cape Espichel and the shallow ground fronting the entrance to Setubal. The first is in Baliera bay, 3 miles from the cape, in 15 to 30 fathoms, sandy bottom; the next, Cezimbra bay, with the fishing town of the same name, to the west of cape Ares, which is high, salient, with a small detached rock close to it, and 4 miles from Balieira. The best anchorage here is off the town, in 7 or 8 fathoms, near the shore;

for in 10 and 12 fathoms there is a bed of rocky ground from 100 to 150 yards wide, which extends a considerable distance along shore.

To avoid this rocky ground close the shore until the detached rock near cape Ares is shut in. When at the anchorage inside, in 7 or 8 fathoms, this rock will be shut in with the cape; but it is advisable to anchor outside this foul ground in order to have room to weigh and work off, should the wind change to the southward. From cape Ares the land continues high and steep with rocky cliffs for about 8 miles to the town of Setubal, and about mid-way is fort Arrabida, with a convent and chapel on the high land over it.

LIGHT.—On cape Espichel is a hexagonal tower, standing southward of the convent, which exhibits, at an elevation of 535 feet above the level of high water, a group *flashing white light*, showing groups of *four flashes* at short intervals, each group being separated from the next group by an interval of *fifteen seconds*, which is a longer interval than that between the flashes. The light should be visible in clear weather from a distance of 28 miles.

In thick and foggy weather a fog bell gives groups of *four* consecutive strokes, separated by a long silence.

Semaphore.—There is a semaphore station at Espichel lighthouse, with which vessels can communicate by the International code. (See Meteorological signals, page 7.)

SETUBAL (St. Ubes) is the third port of Portugal. The town stands on the north side of the estuary of the river Sado, which rises in the south of the province of Alemtejo, and after a course of about 110 miles, 35 of which are navigable, it forms a wide estuary, and falls into the sea.

The harbour, formed at the estuary of the Sado, is enclosed from the sea by a tongue of sandy land, which leaves the southern shore and extends in a northerly direction; between the end of the tongue and the opposite shore is the entrance, about three-quarters of a mile broad, but this is narrowed to about a quarter of a mile by a strip of sand which extends in a westerly direction from the end of the tongue, over three-quarters of a mile, to abreast fort d'Ontao.

Depth of water.—There are about 12 feet at low water on the bar, and from 14 to 21 fathoms in the channel at the entrance of the harbour. Within this, and along by the north shore, there are 15 to 10 fathoms.*

* See Admiralty plan: Setubal, No. 2,714, scale, $m = 2.7$ inches, and plan on chart, No. 87, cape Finisterre to cape St. Vincent.

The bar.—About three-quarters of a mile west of fort Arrabida a shallow sandy flat leaves the shore, and sweeping to the south and east for a distance of 6 miles, covers the entrance to the harbour, and joins the tongue of land about 4 miles southward of its north end. A channel into the harbour, carrying from 3 to 20 fathoms water, is formed through the sand, having at its entrance a bar with about 12 feet over it at low water, which lies about $1\frac{1}{2}$ miles south of Arrabida fort, and which is marked by two buoys. The northern buoy is white, marked with the letter N, and lies S.W. $\frac{1}{2}$ W., $2\frac{1}{2}$ miles from the lighthouse at Outão point; the southern buoy, about 3 cables S.E. $\frac{1}{4}$ S. of the first is red, and marked with the letter S. At high water springs there are 25 feet over the bar, and at high water neaps about 21 feet.

Anchorage.—In front of the town there is good anchorage in $5\frac{1}{2}$ to 8 fathoms. Between the tongue of sand and the eastern shore is an extensive sand-bank, which uncovers at about half ebb, with channels on either side of it, in which there is also good anchorage on a sandy bottom, but the depths are very irregular.

The trade of this port is considerable; its principal exports are salt, cork, tinned sardines, and oranges, of the annual value of about £90,000. The imports consist almost entirely of coal, of the annual value of about £3,000. Population in 1878 was 25,991. About 560 vessels of all nationalities enter the port annually, of the aggregate tonnage of about 102,940 tons. A British Vice-consul resides here.

There are building yards for the repairs of wooden ships, but no facilities for repairing the hulls of iron vessels. Ships' chandlers furnish supplies to merchant vessels. There are no special custom-house or quarantine regulations, and no home for sailors.

There are no diseases for which special precautions are necessary. An embankment or large quay is in course of construction.

Communication.—There is steam communication with London and Bordeaux; and railway and telegraphic communication with all parts of the continent.

Coal.—About 200 tons of coal are usually kept in store, the price being 20 shillings per ton. There is no wharf, but vessels go alongside a hulk, which serves as a depôt, to coal.

LIGHT.—On Outão point, near the fort of the same name, on the north-west side of entrance to the harbour, is a circular tower, which exhibits at an elevation of 489 feet above high water, a *fixed white* light, visible 15 miles.

Tides.—It is high water, full and change, at Setubal, at 2h. 30m.; springs rise $11\frac{1}{2}$ feet, and neaps 7 feet. Westerly winds increase the rise of tide.

Pilots.—The pilot station is in the cove adjoining Arrabida point, and when the pilots cannot get outside the bar, they guide ships entering the harbour by signals from the pilot boat, which is anchored at such times in the fairway, just within the bar.

Directions.—Vessels bound into Setubal should bring the lighthouse to bear about N.E. $\frac{3}{4}$ E., and steer for it; when fort Arrabida bears N. by E., distant $1\frac{1}{2}$ miles, being then close to the bar, steer for the fairway channel between the white and red buoys, with the south-east part of fort San Philip just open to the southward of Outão; with these marks on, pass close to Outão fort, keeping along by the north shore, and having passed Albarquel fort, an anchorage may be selected off the town in from 5 to 8 fathoms at low water.

The best time for passing the bar is, of course, with a rising tide.

CAPE SINES.—From Setubal to the southward, the shore is generally low, with a sandy beach and some downs. Pesqueira point projects, and to the southward of it are two small hills, with houses on them, which serve to mark this part of the coast; the southern hill is named San Thiago de Cassem, on which is a castle and town, and can be seen from a considerable distance. Two small rivers, the Melides and André, here fall into the sea, but are fit only for small craft. Cape Sines, about 31 miles southward of Outão lighthouse, is steep-to, with two small islets, called Perceheiras, close off it.

The castle and town of Sines are built on the shore just to the south of the cape; its chief exports are wax, wine, cork, wood, and fruit, of the aggregate annual value of about £60,000. There are no imports.

About 230 vessels of all nationalities enter the port annually, representing a total tonnage of about 47,260 tons.

There is steam communication to Lisbon and the ports of Algarve, and telegraphic communication with all parts, but no railways. The population in 1878 amounted to 3,148, and are chiefly engaged in fishing.

A sweep of the beach here forms a bay, which affords shelter from northerly winds, but is open to the south-west. Vessels generally anchor off the town in 9 to 15 fathoms, sand.

Approaching cape Sines from the northward, at a distance of 3 or 4 miles, it appears low, but will be known by the windmills upon it. A short distance from the innermost mill is a dwelling house or farm, and at a cable or so outside the cape the rugged islets of Perceheiras will be seen.

The next object of notice is a square built and cement-fronted building, and soon after the town will be visible. From the haze which frequently overhangs the land, the objects on shore are extremely difficult to distinguish.

LIGHT.—On cape Sines, stands a lighthouse 75 feet high, from which, at an elevation of 130 feet above high water, is exhibited a *fixed white* light, visible seaward through an arc of 270° between S.W. $\frac{5}{8}$ S. and N.W. $\frac{5}{8}$ W., and should be seen in clear weather from a distance of 17 miles.

The coast from cape Sines is generally low and sandy as far as Aljezur, about 35 miles; from thence to cape St. Vincent, it becomes higher, with steep rocky cliffs. The Serra de Monchique, the highest part of which, named Foia, 2,963 feet high, is a remarkable feature of the coast, rising about 25 miles E.N.E. of cape St. Vincent, and about 12 miles eastward of Aljezur.

Pacegueiro islet.—At 9 miles southward of cape Sines is the islet of Pacegueiro, separated from the main by a narrow channel, where small craft may anchor in fine weather, in 2 to 3 fathoms, stony bottom; a little to the northward of the fort there is an inlet, visited by coasting vessels.

River Mira.—About 5 miles southward of Pacegueiro islet are some small steep cliffs of a reddish colour, and about 4 miles beyond it is the bar of the river Mira. The mouth of this river is from 170 to 200 yards in breadth; a sandy shoal projects from the southern side, leaving the passage along the northern shore, upon which is a fort, and a mile above it the town of Villa Nova. The bar has 9 or 10 feet water over it, and within it the river is 12 feet deep, and navigable by coasting vessels as far as the town of Odemira, which is 12 miles from its mouth.

The coast continues sandy for nearly 3 miles to the southward of the bar of the Mira, where there is another patch of red cliffs like those to the northward, and which are excellent marks for this part of the coast.*

* A harbour light is exhibited at Villa Nova, Milfontes, north side of the entrance to the river Mira. The light is a *fixed white* light of the fifth order.

River Odeseixe.—Cape Sardaõ, a projecting high cliff, is about 6 miles southward of the red cliffs, and 3 miles farther on is the mouth of the river Odeseixe, which divides the province of Alemtejo from that of Algarve.

Agulha rock.—About 6 miles southward of the Odeseixe is the entrance of a small river leading to the town of Aljezur, on a sand-hill, crowned by the remains of an old castle; and $3\frac{1}{2}$ miles farther on are the ruins of Arrifana battery, on the point of the same name with a sandy beach, and about a cable off it there is a remarkable rock named the Agulha. At 4 miles beyond this rock is the point and ruins of Carrapateira fort; thence follows, nearly 11 miles more to the southward, cape St. Vincent.

From the red cliffs to the cape the coast is composed of high, steep, rocky cliffs, except the beach at Arrifana point, and another small one a mile northward of the cape.

GORRINGE or GETTYSBURG BANK, the area of which comprised within the depth of 100 fathoms, is nearly circular in shape, has an average diameter of 5 miles, and is included between the parallels of $36^{\circ} 29\frac{1}{2}'$ and $36^{\circ} 34\frac{1}{4}'$ N., and long. $11^{\circ} 31\frac{1}{2}'$ and $11^{\circ} 38\frac{1}{4}'$ W.

The shoalest part, within the depths of 35 to 30 fathoms, appears to be a narrow ridge 2 miles in extent, running nearly east and west; the least depth of 30 fathoms being confined to a small patch in lat. $36^{\circ} 31\frac{1}{2}'$ N. and long. $11^{\circ} 35\frac{1}{2}'$ W.

The nature of the bottom at depths under 50 fathoms was found to consist of rock and coralline matter; in depths exceeding 50 fathoms, pebbles, coralline substances, shells and sand.

Beyond the depth of 100 fathoms the soundings increase rapidly. The depth of 1,000 fathoms from the shoal ground being about 5 miles in a northerly direction; 6 miles in a southerly; 13 miles to the westward; and 11 miles to the eastward. At 20 miles distant in a north-westerly direction, 2,750 fathoms were found, and in a north-easterly direction 1,640 fathoms.

The tide was observed in H.M.S. *Salamis*, when at anchor on the shoal ground, on the 4th March 1877 (spring tides), to set regularly north-east and south-west, with a maximum velocity of about $1\frac{1}{2}$ knots.

Fish in abundance were caught on the bank.*

CAPE ST. VINCENT or San Vincente, is about 200 feet high,

* See Admiralty plan of Gorringe or Gettysburg bank, No. 434, scale, $m = 1.0$ inch.

bluff, and level, having an old convent on which is a lighthouse, and other buildings on its summit. At about 50 yards from the pitch of the cape there is a high isolated rock, called the giant of the cape, with $5\frac{1}{2}$ fathoms water, sand and shells between them; at a cable from the rock there are 20 fathoms. From the cape the coast, composed of high steep cliffs, trends to the S.E. by S. for 3 miles to Sagres point, which is about 200 feet high, with a small village containing about 400 inhabitants, and signal tower on it; nearly a mile from the convent is fort Belixe.*

The position of the cape will be known by the Serra de Monchique, which terminates in two distinct peaks; the western named Foia, 2,953 feet high, is, next to mount Estrella, the highest land in Portugal, and may be seen at a great distance; the eastern peak is named Picota, 2,539 feet high, and both being of rocks that reflect the light, appear whitish when seen from a distance, particularly from the northward.

Aspa pyramid, a white tower 32 feet high, standing on a hill near the coast 522 feet above the sea, and nearly $4\frac{1}{2}$ miles N.E. $\frac{1}{4}$ E. from cape St. Vincent lighthouse, is a very conspicuous landmark, and it may be seen from a distance of 20 miles.†

LIGHT.—The circular lighthouse on the convent on cape St. Vincent exhibits at 220 feet above high water, a *revolving white* light, attaining its greatest brilliancy every *two minutes*, and seen in clear weather from a distance of 20 miles. This light is reported to revolve irregularly, 1888.

Semaphore.—At Sagres there is a Semaphore station, with which vessels can communicate by the International code. The station, which is conspicuous, consists of a truncated conical tower, white-washed, with a semaphore and flagstaff on the summit. (*See Meteorological signals, page 7.*)

Currents.—In light winds, sailing vessels should preserve a good offing when in the vicinity of cape St. Vincent, as the currents generally set strong along shore, and have a tendency towards the cape. Ripples are occasionally seen off the cape. (*See also pages 13–15 for Currents and Caution.*)

Fog.—Dense fogs are frequent at all seasons of the year in the vicinity of cape St. Vincent.

* *See Admiralty charts*:—Cape St. Vincent to the strait of Gibraltar, No. 92; scale, $\pi = 0.2$ inches.

† Between Cape St. Vincent and Piedade point, fishing nets are periodically laid down.

SOUTH COAST of PORTUGAL.—On the east side of Sagres point is the bay of the same name, where vessels will find shelter from northerly winds by anchoring in 11 fathoms water, about half a mile from the shore.

Balieira point is the east extreme of Sagres bay, and on its north side is Martinhal bay, with three rocky islets, where anchorage for small vessels may be found in 5 or 6 fathoms. Vessels should leave these bays directly the wind changes.

Piedade point.—At 13 miles eastward of Balieira point is Piedade point, at the entrance to Lagos bay, and the termination of some whitish high land, named the Alto de Barril, which extends two miles in an east and west direction; the coast all along being generally of steep cliffs, with patches of beach.

Piedade point is steep and rocky, with a hermitage on it; several large rocks lie along its eastern face, and a reef extends from it about a cable to the southward.

Monte Figo.—The principal features of this coast, from a distance, are the Serra de Monchique, already described, monte Figo, and monte Gordo. Monte Figo is a low double peak, 1,365 feet high, and is just seen over the low land of the coast rising about 9 miles to the north-east of cape St. Mary; it is more distinctly visible from the eastward or westward, as it then appears separated from the mountains to the northward of it, but from the southward it is blended with them. In approaching from the westward this mountain is not visible until 10 miles eastward of cape St. Vincent, and it should not be mistaken for a smaller mountain to the north-west of it.

Monte Gordo, in Spain, is 5 miles to the eastward of the Guadiana river, and about the same height as mount Figo. The town and ruined castle of Ayamonte, on a hill on the eastern bank of the Guadiana, is seen from seaward 10 or 12 miles, and is a good mark for entrance to that river.

Gales from S.E., S., and S.W. are the most dangerous on the south coast of Portugal, as there is not a single harbour of refuge where vessels, overtaken by them, can find shelter, and they are therefore obliged to seek distant ports with much risk and loss.

The entrances to the harbours on the coast are fringed with dangers over which the sea breaks during heavy weather.

LAGOS, the chief town on the south-west coast of Algarve, stands about $1\frac{1}{2}$ miles to the northward of Piedade point, on the west side

of the entrance to the river Lagos. It has a cathedral, is surrounded with ancient walls, and contains about 10,000 inhabitants. The national flag flutters from a dilapidated fort at the foot of the town, and close under this fort, and protected by some rocks, is the only practicable landing place, should there be the slightest swell. Landing here is at all times unpleasant, and often dangerous.

The chief exports are tinned sardines, salt fish and figs ; and the chief imports are Italian and French oil and tin. In 1886, 334 ships of all nationalities, representing an aggregate tonnage of 50,820 tons, entered the port. The movement of shipping, however, has a tendency to increase.

There is steam communication with Lisbon and intermediate ports ; there are no railways, but it is in telegraphic communication with all parts.

There are no diseases against which special precautions are necessary.

The north shore of Lagos bay is a sandy beach, the land rising and presenting a pleasing appearance, with numerous towns villages, and houses ; the town of Mexilhoeira is sufficiently elevated to be seen 12 or 15 miles at sea.*

No coal is kept in stock.

Navigability.—The river Lagos is a small stream, and vessels of 7 or 8 feet draught may enter at high water, with the aid of a pilot.

Water.—Water may be obtained from the river at a suitable time of tide.

Alvor.—The town of this name is 3 miles from the mouth of the river Verde, which is navigable also at high water for small vessels up to the town, but the bottom at its entrance, which is $3\frac{1}{4}$ miles eastward of Piedade point, is rocky and foul.

Tres Irmaõs point, (three Brothers), nearly 3 miles farther on, is the east extreme of Lagos bay, and of moderate height, with three small rocks off it, and hence its name ; to the eastward of it is the bar of the river Silves, the coast being generally rocky, with a few patches of open beach.

Anchorage.—Lagos bay affords good anchorage with northerly winds. Large vessels anchor a mile or more east of Piedade point in 12 or 15 fathoms water, fine dark sand, as tenacious as clay, into which the lead sinks deeply and is withdrawn with difficulty ; and

* See Admiralty plan :—Lagos bay, on chart, cape Finisterre to cape St. Vincent, No. 87.

smaller vessels nearer the town, in 8 or 10 fathoms. Coasters lie close in, and find shelter even from south-west winds.

Tides.—It is high water, full and change, at Lagos, at 2h. 7m.; springs rise 13 feet. The bar of the river is just covered at low water.

The **RIVER SILVES** is much frequented by coasters, but can only be entered at two-thirds flood, with the aid of a pilot. The bar has only about 7 feet over it at low, and 16 feet at high water springs, but in winter the bar is rarely passable for vessels, as the breakers are dangerous, and there is a swell a long way outside them; within, the water is deeper, and for nearly 3 miles up there are from 11 to 3 fathoms; thence the river is navigable as far as the town of Silves, about 7 miles from the entrance. On each side of the entrance there is a fort.

Villa Nova de Portim o.—This town, containing, in 1878, about 10,000 inhabitants, stands on the west shore, about $1\frac{1}{2}$ miles within the mouth of the river Silves. The exports consist chiefly of cork, wine, figs and almonds, of the aggregate annual value of about £142,000. The imports are flour, petroline, cotton and woollen goods, of the aggregate annual value of about £33,000.

From 400 to 450 vessels of all nationalities enter the port annually, representing a total tonnage of from 100,000 to 130,000 tons.

There is a special duty of 40 reis per ton on vessels entering the port. There is steam communication to Lisbon and the ports of Algaive. There are no railways, but there is telegraphic communication with all parts.

Tides.—The time of high water and rise of tide may be considered the same as Lagos.

Water is scarce and has to be brought from a distance of 4 miles.

Coast.—About 4 miles S.E. by E. of the bar of the Silves is cape Carvoeiro, which is rocky, and of moderate height, with a fort on it; thence the coast trends eastward for 3 miles to Santa Rocha, a bluff point with a battery on it; then a low beach follows to the mouth of the river Algoz, which flows into a bay about 5 miles from cape Carvoeiro, and 3 miles westward of Balieira point. The town of Pera is picturesquely situated on the east bank of the Algoz, $1\frac{1}{2}$ miles from its entrance.

Between Balieira point and Albufeira point, a little east of it, is a small bay, fit for small vessels, and at the head of it is the town of Albufeira. From point Albufeira the coast of low rocks trends eastward, with a bend northward for 5 miles to Vallonga fort, and nearly a mile beyond it is the mouth of the river Quarteira. About

1½ miles S.E. ½ E. from the entrance of the Quarteira river is a tower of the same name; thence follows the sandy beach and plain—called the beach of Ançãõ—in the above direction to the south-east end of Barreta island, at 3 miles beyond which is cape St. Mary. Loulé fort stands on the coast, about 2½ miles from the tower of Quarteira.*

LIGHT.—Near Balieira point, about a mile from the town of Albufeira, is a red lighthouse, from which is exhibited, at an elevation of 123 feet above high water, a *fixed white* light, visible through an arc of 240°, or between the bearings of S. 48° W. through north to S. 71° E., and should be seen in clear weather from a distance of 9 miles.

FARO, one of the chief towns on the coast, stands at the entrance of the little river Valfermoso, nearly 4½ miles north of the lighthouse at Cape St. Mary. It is visible from every direction, and easily recognized by its two white steeples, as well as by the chapel of San Antonio on a hill east of the town, which is white, and can be seen at some distance abreast. The population of Faro in 1878 amounted to 82,417.

The chief exports are dry figs, almonds, sardines, and cork of the annual value of about £358,600. The chief imports are wool, barley, iron and tin, of the annual value of £103,800. About 340 vessels enter the port annually, representing an aggregate tonnage of about 79,760 tons.

There is communication by steam and sailing vessels, and telegraphic communication with all parts. A railway to Lisbon is in course of construction.

Supplies to shipping may be easily obtained.

Directions.—The approach to Faro is by either of three channels, one west of cape St. Mary, and two east of it; there is a bar at each entrance having from 9 to 12 feet at high water, but as the depths frequently alter the aid of a pilot is necessary. The channel by which vessels generally enter is abreast the town of Olhão, eastward of the lighthouse, where there is a pilot and lifeboat station.†

CAPE ST. MARY is the south extreme of several low sandy islands, which border the coast for a long distance to the north-west, and to the eastward of it. Vessels in the vicinity of the cape should not approach the coast at night or in thick weather, as at 1½ miles southward of the lighthouse there are only 3½ fathoms water, and

* Tunny fisheries have been established at Oiza, a little east of Albufeira, Piedra de Galle, and cape Carvoeiro; the coast near these points should therefore not be approached within the distance of two miles.

† It is intended to establish two small fixed red lights at Olhão.—December 1887.

2 miles 8 fathoms, when the depth rapidly increases, so that at 5 miles from the cape there are about 90 fathoms, and a little farther out no soundings with 150 fathoms; the bottom is generally sandy, with small shells.

LIGHT.—On Cape St. Mary is a circular tower, which exhibits, at an elevation of 109 feet above high water, a *fixed white* light, seen in clear weather from a distance of 15 miles.

Fuzeta is about 5 miles to the eastward of Olhão. Here a small *red* light is exhibited, which is intended only for the use of the fishing vessels, and mariners should not rely on the regularity of its exhibitions.

TAVIRA.—About 25 miles eastward of cape St. Mary light-tower is the mouth of the river Guadiana. The coast between, for the greater part of the distance, is bordered by a series of long low sandy islands, with salt ponds, separated by narrow navigable channels for boats, and backed by high land. On the longest of these islands are several sand-hills, to the north-east of which and 13 miles from St. Mary's light tower is the town of Tavira, built on both sides of the river Gilão, whose inhabitants carry on a brisk coasting fishing trade.

The chief exports of Tavira are almonds, locust beans, oil and wine, the annual value being about £20,000. The chief imports are hemp and wire cables, the annual value being about £4,000. About 30 vessels enter the port annually, representing an aggregate tonnage of about 6,000 tons. There is steam communication with Lisbon and telegraphic communication with all parts. There are no railways.

Wooden vessels can be repaired in the building yards, and supplies may be obtained from ship chandlers. A quay is in course of construction.

The population of Tavira in 1878 amounted to 7,000.

The coast thence for 12 miles to the Guadiana is low and sandy, and between are the churches of Conceição and Cacela.

Bar.—Tavira bar is of loose sand, and continually shifting; pilots are therefore necessary.

Anchorage.—There is anchorage with off-shore winds outside the bar in 4 or 5 fathoms water.

The **RIVER GUADIANA** rises in New Castile, and after a tortuous course through Spain, forms its boundary for some distance, and then enters Portugal, through which it flows for nearly 100 miles more; then again, forming the boundary of those kingdoms, to the

sea. Of its whole length of more than 400 miles, about 40 miles only are navigable up to the town of Mertola, and it discharges itself into the sea a little southward of the towns of Villa Real and Ayamonte.

Depth of water.—At low water springs there are said to be only 6 feet on the bar of the Guadiana, and it cannot be crossed without the aid of a pilot.

Villa Real and **Castro Marin**, Portuguese towns, are on the west bank of the river, the former about a mile, and the latter about 3 miles from San Antonio point. About midway between the towns the Castro Marin creek takes a N.N.W. direction, and has 8 to 10 feet in it at low water springs.

About 480 vessels, of the aggregate tonnage of about 79,000 tons, enter the port of Villa Real annually; and the chief exports are copper ore, fish, timber, and fruit, of the total annual value of £398,000. The chief imports are iron, coal, machinery, olive oil, and tin, the annual value being £40,000. There is steam communication to Lisbon and intermediate ports, but there are no railways; electric telegraph communication with all the world.

Vessels can be beached in order to be caulked, and repairs to machinery can be effected at the mine of S. Domingo, near Pomarão higher up the river. Supplies to merchant shipping can be obtained at the port.

Population of Villa Real in 1878 was 6,838.

Coal.—From 500 to 600 tons of coal are kept in store at Villa Real, the price being 20 shillings per ton. There is no wharf, but vessels go alongside a floating depôt to coal.

Ayamonte is on the Spanish side, about 2 miles from Canela island, at the entrance of the river.

The exports at Ayamonte consist chiefly of fish and lime stone. From 15 to 20 steamers (all British) enter the port yearly, which represent an aggregate tonnage of from 10,000 to 11,000 tons. There are no railways and no steam communication. There is telegraphic communication with Huelva. As there are no docks only small repairs can be made to vessels. There is a hospital for seamen. The population of Ayamonte in 1886 was 7,840.

Coal.—Coal cannot be obtained at Ayamonte, but when required, it is brought in barges from Huelva, the price being 22 shillings and 10 pence per ton.

Pomarão is a Portuguese village on the right bank of the Guadiana, and said to be about 40 miles from its mouth. Vessels of 500 tons ascend to this place, and a steam tug plies between it and the bar of the Guadiana for the assistance of sailing craft in contrary winds.

The navigation for steamers is easy. The anchorage off the village is good, but the tides are strong, and if any stay is intended, it is requisite to moor.

There are piers for the accommodation of vessels shipping ore, large quantities of which is brought down by rail from the mines of San Domingo, situated some 10 miles off. These mines employ about 3,000 people, and the ore is exported at the rate of from 8,000 to 10,000 tons a month. Two vessels of 500 tons can be loaded in 24 hours.*

About a third of a mile below Pomarão, where a small river runs into the Guadiana, a vessel can be grounded on a sandy beach, and at low water have her bottom cleaned.†

Ayamonte bar.—The entrance to the Guadiana is encumbered with shoals, which extend to seaward for a considerable distance from both points, and as the sands are constantly shifting, the bar cannot be crossed without a pilot. At low springs there are said to be only about 6 feet water on the bar, but within vessels of 12 feet draught may navigate as far as Pomarão at any time of tide without touching the numerous sand-banks; vessels drawing 16 feet have reached Pomarão, but they go up and drop down with the tide; one shoal has only 15 feet on it at high water neaps.

In most parts of the Guadiana, as far as Pomarão, the depth is said to vary from 3 to 6 fathoms, and the river is safe and convenient to lie in.

Off Villa Real, where the breadth of the river is about 840 yards, the depth is 27 feet. At Ayamonte the breadth is about 420 yards, and depth 20 feet, whence it opens out wider with 20 and 22 feet water.

Buoys.—There are two red buoys on the west side of the river entrance, and two black buoys on the east side.

Higuerita.—Between Canela point and Ayamonte are the mouths of two creeks, which run eastward parallel with the coast; they are almost dry at low water, but navigable for the boats of the coast with a flood tide. The southern creek leads to Higuerita, a distance of 4 miles, where there is a shallow entrance from the sea, and two *fixed green* lights are exhibited to guide vessels through the channel. There are 3 fathoms at low water off the town of Higuerita, at which time there is only 3 feet water upon the bar.

* Lieutenant Smail, H.M.S. *Wizard*, October 1869.

† **Wreck.**—The wreck of the English steamer *Dania* lies sunk off Pomarao, and is dangerous to navigation.—March 1887.

The northern creek passes by Higuerita, and continues past Tuta, near which place it flows into the sea, forming the low island called Cristina.

Pilots for the Guadiana river will generally be found cruising near the bar; their boats are distinguished by having the letter P inscribed upon the Portuguese national flag. In strong southerly winds, when unable to come out, they remain just inside the bar, and by waving a red flag indicate the direction in which the vessel should steer.

LIGHTS.—Ayamonte bar.—On Canela island, at the east side of entrance to the Guadiana, two fixed lights are exhibited for crossing the bar of Ayamonte. The northern light is a *red* light, at an elevation of 109 feet above high water, and the southern light is a *white* light, at an elevation of 43 feet above high water; the lights are visible in clear weather from a distance of 9 miles, and when in line lead over the bar.

A light is shown from Medo-Alto, on the west bank of the river.

Higuerita bar lights.—Two *fixed* lights are exhibited on Canela islet; one a *green* light is 36 feet, the other a *white* light 20 feet above the sea, and are seen in clear weather from a distance of 9 miles. The lights in line bearing N. 42° W., lead over the bar.

There are also two *fixed green* leading lights on Mojarre point. The lights are 57 yards apart, the northern light being 24 feet and the southern light 17 feet above high water. They are visible from a distance of 10 miles.

Tides.—It is high water, full and change, at the bar of the Guadiana, at 1h. 57m.; springs rise 12 feet.

Telegraph cable.—There is a submarine cable from Villa Real to Cadiz.

Fog.—Dense fogs are frequently experienced in the vicinity of the river Guadiana during the winter.

CHAPTER VII.

SOUTH COAST OF SPAIN.—RIVER GUADIANA TO GIBRALTAR.—

NORTH-WEST COAST OF AFRICA.—CEUTA BAY TO MOGADOR.

 VARIATION IN 1891.

Cape St. Mary	-	17° 40' W.	|	Gibraltar	-	-	16° 40' W.
				Mogador			17° 20' W.

COAST.—From the river Guadiana the low sandy coast trends eastward and southward—forming a bay about 10 miles deep—for nearly 58 miles to Chipiona point, on the south side of the entrance to the river Guadalquivir. The most prominent features in the land are monte Gordo (page 374), the town and ruined castle of Ayamonte, and a hill a little eastward of Chipiona point. The coast consists of low sand-hills, and there are several small towers at intervals along the shore. Several rivers discharge their waters into the sea, having low islands formed at their entrances; but they are navigable only by coasters, on account of the shifting and shallow bars. The soundings are regular, and there are from 9 to 12 fathoms water at about 5 miles from the shore.*

The bar of Tuta is 5 miles to the eastward of that of Higuerita, it is formed between two low sandy points, that on the west being the east end of Cristina island, and its eastern the main land. It is dry at low water, and at high water only fit for small coasting and fishing vessels.

RIVER PIEDRAS.—The tower of Catalan stands upon an eminence of rugged reddish ground upon the west bank of the river Piedras, which has a narrow mouth and two entrances 3 miles apart, called the bar of Terron, and Marijato bar.

The bar of Terron—eastward of which a sandy island, called Levante, lies parallel with the coast, extending 3 miles—has a depth of $3\frac{3}{4}$ feet at low water, and is subject to change.

Marijato bar lies between the east end of Levante island and a sandy point running out from the main. To cross this bar it is

* See Admiralty chart :—Cape St. Vincent to strait of Gibraltar. No. 92; scale, $m = 0.2$ of an inch.

necessary to keep nearer to Levante island than the main; the broken water points out the narrow channel, and having entered it, proceed between Levante island and the main to the westward, and anchor as convenient in 4 or 5 fathoms. It has only 3 feet water over it at low water, and both this and the preceding entrance, merging into the river Piedras, lead up to the towns of Lepe and Cartaya, both of which have a considerable trade.

LIGHTS.—At Rompido de Cartaya, on the north bank near the eastern entrance of the river Piedras, is a white circular tower, which exhibits, at an elevation of 81 feet above the mean level of the sea, a *fixed white* light, varied by a *flash* every *four* minutes, and visible in clear weather from a distance of 14 miles.

As a guide over the bar of Terron (the western entrance to the river Piedras) two fixed lights are exhibited, viz., a *white* light at an elevation of 66 feet above high water, and a *red* light at an elevation of 74 feet above high water; both the lights are visible from a distance of 9 miles, and when in line, bearing N. $11\frac{1}{2}^{\circ}$ E., lead over the bar.

RIVERS ODIEL and TINTO.—Umbria point and tower (which is very conspicuous) at the entrance to the rivers Odiel and Tinto, is $7\frac{1}{2}$ miles to the S.E. of the bar of Marijato. On the east side of the point—within the entrance—is the low and sandy island Saltés, about $2\frac{1}{4}$ miles in length, the south-east extreme of which is the west point of the main entrance to the rivers. Sand-banks extend to the south-eastward from Umbria point, and from the island for a distance of nearly 6 miles, running parallel to the coast, and between them are narrow channels into the rivers, with from 2 to 5 feet in them at low water.

The canal del Padre Santo, formed between the termination of these banks and a bank extending $1\frac{1}{4}$ miles from the coast, is nearly 2 cables wide, and is the principal passage into the rivers. From the position of the Padre Santo lights, the shore trends north-westward 7 miles to the point and tower of Arenilla, where there are 14 fathoms water at the confluence of the rivers, and here the river Tinto trends to the N.E. by E. to the towns of Palos and Moguer.*

Depth of water.—At spring tide a vessel drawing 20 feet can cross the bar in fine weather, but when the tides are low a vessel should not draw as much as 17 feet; but as the bar constantly shifts, strangers should not enter the river without a pilot.

* See Admiralty plan :—Entrance to rivers Odiel and Tinto, port of Huelva. No. 72; scale, $w = 2.8$ inches.

Huelva.—The town of this name is situated on the eastern bank of the Odiel river, about 3 miles above Arenilla point.

The population of Huelva has been increasing with its prosperity, but on account of its chief wealth being mineral, it is subject to fluctuations, from the large numbers engaged in mining operations: according to the last official census the population was 13,000.

The chief imports in 1889 were coal, coke, iron, steel, alcohol, &c., of the aggregate value of £1,619,108; and the chief exports in 1889 were minerals, wine, cork, &c., representing an aggregate value of £5,353,575. The number of vessels of all nationalities that entered the port in 1889 was 1,785, representing an aggregate tonnage of 812,421 tons.

There is railway communication with Seville, and there is a railway in course of construction to Zafra; the Rio Tinto and other mining companies have railways from the mines to their private piers or jetties, which are of great size and splendid construction.

There is communication by sea to Great Britain, the United States, Rotterdam, Hamburg, Bilbao, and Marseilles, and telegrams may be sent to any place where there is a telegraphic station.

Provisional repairs both to the hull and machinery of vessels may be effected, but there is no dock or accommodation for the repair of vessels.

The custom-house regulations are those which are in force in all Spanish ports. There are no special quarantine regulations.

The public health at Huelva is excellent, and there are no diseases against which special precautions are necessary. There are two hospitals, the Provincial hospital, and a private hospital, the property of the Rio Tinto Mining Company.

Coal.—Importers of coal and coke have their head offices in Great Britain. The Rio Tinto and Tharsis Companies will amply supply coal, the average price being 24 shillings per ton; these companies have their own piers for discharging and loading vessels. At the Rio Tinto pier vessels are discharged by hydraulic and steam cranes, and load by shoots.

At the Tharsis pier both operations are effected by means of steam cranes.

The depth of water at the Rio Tinto pier averages 13½ feet at low water spring tides; at the Tharsis pier, 18 feet; at the town jetty, 11 feet.

Harbour works.—The harbour works are progressing very

slowly. In 1885 contract was made for deepening and improving the entrance of the port by the removal of 2,000,000 cubic metres of mud.

Anchorage off Huelva is good, the depth being from 17 to 22 feet at low water ; but it is requisite to moor, as the tides run as much as $3\frac{1}{2}$ knots an hour.

Moguer is $6\frac{1}{2}$ miles from Arenilla point, on the left bank of the Tinto ; agriculture, flour mills, brandy distilleries, a few hand looms for coarse linens and hempen stuffs are the chief means of employment. Oil, wheat, &c., are imported ; and wine, the principal production of the district, exported.

Palos, a small town about $2\frac{1}{2}$ miles from Arenilla point, is celebrated and interesting as the place from which Columbus sailed on his first voyage to America, August 3rd, 1492. The depth here abreast the town is from 8 to 14 feet.

Tides.—It is high water, full and change, at Huelva at 2h. 6m., and at the bar at 1h. 54m. ; and the rise is about 14 feet. The stream at the anchorage of Huelva runs at the rate of $3\frac{1}{4}$ miles an hour.

A rescue station is maintained at Huelva.

LIGHTS.—Near Padre Santo point, on the eastern shore of the mouth of the river Odiel, two *fixed* lights are exhibited ; the northern light is a *red* light, elevated 103 feet above high water, and the southern light is a *white* light, elevated 65 feet above high water. The lights should be visible in clear weather from a distance of 9 miles.

As the bar is subject to constant change, the leading lights are shifted accordingly.

An auxiliary leading light is shown from Morro point, about $5\frac{1}{2}$ cables N.W. by N. from Casa de los Torreros ; the light is a *fixed red* light, elevated 36 feet above high water, and should be seen in clear weather from a distance of 9 miles.

Buoys.—A black buoy marks the western side of the channel entrance, and a red buoy the eastern side, and as the bar is subject to constant change the position of these buoys are shifted accordingly.

RIVER GUADALQUIVER.*—About 27 miles S.S.E. from Picacho point is the mouth of the river Guadalquivir. The shore between is of sandy downs, and on it are the towers of Oro,

* A permanent fishing net is laid down on the spot known as La Gabia de la Florida, in the river Guadalquivir. See Madrid Notice to Mariners, No. 16, 1886.

Asperilla, Higuera, and Carbonera, the two first being in ruins. The Guadalquivir rises on the borders of Murcia, and intersects Andalusia, draining all its northern portion; it rapidly increases in size by the accession of numerous streams on both sides, and after passing the town of Andujar its course is to the west-south-west to Cordova and Seville. At some distance below Seville the islands Minor and Major divide it into three branches; it unites again below Major, and forms a harbour near its mouth above San Lúcar de Barrameda. The whole course of the river is 250 miles, but it is only navigable up to Seville, where it is crossed by a bridge about 70 miles from the sea, to which, and sometimes beyond it, the influence of the tide is felt.*

Occasionally the river becomes swollen by the melting snow, and when retarded in its course by high tides, the inundations that ensue cause great ravages, and serious loss to the inhabitants on its banks.

Navigability.—The channel of the river has become widened and deepened, so that steamers can easily go up to Seville, but owing to the bends in the river it is not safe for vessels of a greater length than 230 feet. Vessels of 15 feet draught can navigate the channel and enter the port at high water neaps, and vessels drawing 11 feet can do so at low-water springs.

The greatest draught of any vessel which has entered the port was 18 feet.—1890.

Malandar point, on the north side of entrance, is covered with trees, and a lighthouse (which is merely a dwelling house) stands on the low sandy spit; and nearly $1\frac{1}{2}$ miles northward of it is the tower of San Jacinto, seen among the sand-hills on the coast, and a prominent object on approaching the river from the northward. A bank extends in a W.S.W. direction $2\frac{1}{2}$ miles from the tower, and at this distance from it the depth is about $2\frac{3}{4}$ fathoms; the bank with various shallow patches on it, here trends southward and joins the bank which extends off the coast south of the mouth of the river.

Baxo Picacho, the outermost shoal, is of rock, and has only 3 feet water over it; it lies W. by S. about $2\frac{1}{4}$ miles from the tower of San Jacinto, and N.N.E. $\frac{1}{2}$ E. from the church tower of Chipiona; at 2 cables south-west of this shallow part there are $1\frac{1}{2}$ fathoms. The Regla convent, standing a long half-mile south of the town of Chipiona, well open of the town, leads westward of the shoal.

* See Admiralty plan:—Entrance of Guadalquivir river, No. 2,341, scale, $m = 1\cdot4$ inches.

Chipiona point, at 4 miles from Espiritu castle on the south side of entrance, is low and rocky, and has the town or village of the same name on it. An extensive rocky bank surrounds the point, and at $1\frac{1}{2}$ miles from it the Salmedina rocks uncover at low water; from the north-west extreme of the bank the church tower of Chipiona bears about E.S.E. distant 2 miles. To clear these dangers keep San Lucar church tower, which is conspicuous, open of Montijo point, until the steeples of Rota are open of the termination of the sand hills at Almadra. There are 6 to 8 fathoms water near the edge of the bank, and it should be rounded with caution.

Riza reef.—From Chipiona point eastward the shore is bordered at some distance by rocky ledges and shallow water, and at Espiritu point the Riza reef, which partly dries at low water, projects nearly a mile to the north, leaving between it and the shore west of Malandar point a channel into the Guadalquivir $1\frac{1}{2}$ cables wide and $2\frac{1}{2}$ to 3 fathoms deep.

Within this reef the channel widens, but opposite Malandar point, the sands of the south shore extend more than half way across the river to the Riceta shoal, with $1\frac{1}{4}$ fathoms water over it; above which it again widens, and in the navigable part of the river there are from $3\frac{1}{2}$ to 7 fathoms.

SAN LUCAR de BARRAMEDA.—This city and seaport stands on the south bank, at the mouth of the Guadalquivir; the country about it is sandy and undulating, and cultivated with vineyards and gardens. Agriculture is the chief occupation, and fishing employs a considerable portion of its inhabitants. At Bonanza, a mile above the city, is the custom-house and quay.*

Vessels of 17 feet draught can navigate the channel and enter the port during ordinary high tides, and vessels of not more than 11 feet draught may do so with safety during ordinary low tides. The greatest draught of any vessel which has entered the port was $20\frac{1}{2}$ feet, but she was obliged to anchor for 7 days outside the port, waiting for the highest tides.—1890.

The chief exports are wine and salt; the chief imports are coal, sulphur, and barley. 502 vessels, of all nationalities, entered the port in 1889, representing an aggregate tonnage of 217,520 tons. There is communication by steam, railway and telegraph.

No coal can be obtained. There are no docks and no facilities for repairs to hull and machinery of vessels.

* From San Lúcar de Barrameda, Columbus sailed on his third voyage to America, May 30th, 1498, and Magellan on the first voyage of the circumnavigation of the world, August 10th, 1519.

There is no health officer, but the port is considered a Lazaretto of observation only, and vessels under observation are subject to the usual quarantine dues. The population in 1887 was 25,000.

All vessels entering the port whether bound to San Lúcar or Seville, must on arrival at San Lúcar present their original manifesto at the custom-house, and a certified copy of it is given to vessels bound to Seville.

LIGHTS.—**Chipiona light.**—On the Perro rocks, and about 45 yards from the sea, is a light yellow coloured tower, which exhibits at 225 feet above the sea, a *revolving white* light, which attains its greatest brilliancy every *minute*, and visible in clear weather from a distance of 23 miles. The tower stands nearly $1\frac{1}{2}$ miles within the Salmedina rocks.

Espiritu point light.—On Espiritu point, at the south side of entrance, and about a cable from the castle, there is a *fixed red* light to indicate, when bearing S.S.W., that a vessel is within Riza spit and the moment when the course should be altered; it is not seen from the offing.

Malandar point light.—On the beach of Malandar point, north of San Lúcar de Barrameda, a *fixed white* light is shown 36 feet above the level of the sea, visible 6 miles.

Bonanza light.—Near the quay at Bonanza, 52 feet above the sea, a *fixed white* light is exhibited, visible 7 miles.

Anchorage.—There are two anchorages off the mouth of the Guadalquivir where vessels may safely bring up in fine weather; that of Pozo, in 7 fathoms water, with the Perro lighthouse bearing about South distant 3 miles, Chipiona church S. $\frac{3}{4}$ E., and the castle of Espiritu S.E. by E. $\frac{1}{2}$ E.

Grajuela anchorage is nearer the shore, in $5\frac{1}{2}$ fathoms, clay, with the convent of Regla open of Chipiona, Chipiona church S. by W., and Espiritu castle E. $\frac{3}{4}$ S.

Pilots.—The many dangers at the entrance, and within the Guadalquivir, render it necessary for strangers to have a pilot, and weather permitting one may always be obtained, but they only put to sea when a vessel is off the port. The pilot station is at Chipiona point.

Life-boat.—There is a life-boat at San Lúcar.

Tides.—It is high water, full and change, at Salmedina rocks, at 1h. 27m., and at Bonanza at 2h.; springs rise $12\frac{1}{2}$ feet, and neaps 8 feet.

Directions.—With a fair wind, bring the Bonanza and Malandar lighthouses in line, bearing about East, and steer for them until Espiritu lighthouse bears S. by E., when the vessel will be about half a mile from the end of the Riza reef; then keep a little to the northward, and bring Malandar lighthouse in line with the south end of Bonanza custom-house, which will pass the spit in from $2\frac{1}{4}$ to 3 fathoms water. When off the end of the reef, Espiritu lighthouse will bear about S. by W. $\frac{3}{4}$ W., and when that line is crossed and the reef rounded, steer for Salvador castle till Malandar light bears N.W. $\frac{1}{2}$ N., then steer about N.E. $\frac{1}{2}$ E. for Bonanza road, and anchor with the light bearing S.E. $\frac{1}{2}$ E. in about 4 fathoms, sand.

The passages between the shoals at the entrance of the river are adapted only for small vessels.

Coast.—From Chipiona point the low coast with sandy downs trends nearly South for $6\frac{1}{2}$ miles to Candor point, at about 2 miles to the south-east of which is the town of Rota, at the entrance to Cadiz bay. The shore all along is rocky, and at 2 miles southward of Chipiona point the rocks extend off nearly half a mile; and at about three-quarters of a mile farther on is a rocky patch with $1\frac{1}{2}$ fathoms water over it, lying two-thirds of a mile from the shore with the tower on the high land of Beva, bearing E. $\frac{2}{3}$ N. Between Candor point and the town of Rota the reefs and shoal water extend from a half to $1\frac{1}{4}$ miles from the shore.

Rota pier gives shelter to small vessels, which can only go in at high water.

Mountains.—In approaching Cadiz from the westward in clear weather, the first land which will probably be identified are the mountains of Ronda, Ubrique, and Medina.

The mountain of Ronda, named also Cabeza del Moro, is the highest part of an extensive chain, which appears rounded, and rises about 45 miles inland, and when brought to bear E. $\frac{2}{3}$ S. leads direct to Cadiz.

The mountain of Ubrique is about 40 miles inland, and nearly on the same parallel as Cadiz, but less conspicuous than Ronda; it forms a peak from which the land descends in gentle slopes.

The Medina assumes a pyramidal shape, is of less elevation, and about 20 miles nearer the coast than Ubrique. There is a remarkable tower a little below the summit, and easily distinguished everywhere at the entrance of Cadiz bay. The white houses of the town of Medina, on the west slope of the mountain, appear as a white patch.

Beva tower.—The tower of Beva, standing on a high ridge of hills, about 11 miles northward of Cadiz, is a good mark for recognizing the coast, as it can be seen from a long distance. It is square, with a round cupola at the top, and between 2 square houses.

From the northward, the light tower of San Sebastian should not be brought to bear southward of S.S.E. $\frac{1}{4}$ E. until southward of Rota.

CADIZ, the capital of the province of the same name, and one of the most important seaports of Spain, occupies the rocky and comparatively elevated extremity of a long, narrow, low tongue of land, which projects northward for about 5 miles from the isle of Leon, comprising between it and the main land a spacious bay with excellent anchorage. This tongue of land has a causeway along it, and connects the city with the main land; it is in places not more than from 200 to 300 yards across, and is strongly fortified. The mole near San Felipe was some few years ago extended nearly a cable northward, by which means a perfectly sheltered boat harbour has been formed on the eastern side of the town. A pier and wharf have also been built out from Puntales castle, off which steam ships can discharge their cargoes.

The access to Cadiz from the sea is almost impracticable, from the rocks, ledges, and sandbanks by which it is surrounded; and being everywhere defended by ramparts, bastions, and detached forts, is all but impregnable.*

Depth of water.—There are from 5 to 6 fathoms water in the main channel leading to the anchorage off the city. (*See* page 399.)

The streets of the city though narrow, are straight, well paved, and lighted. The houses in general are lofty, and well built of white freestone, with a court in the centre, and are generally crowned by a mirador or turret. There are but few public buildings of importance, the cathedral being the most conspicuous. Along the ramparts is a fine promenade, known as the Alaméda, with an extensive view

* *See* Admiralty plan:—Cadiz harbour and approaches, No. 86; scale, $m = 1\frac{1}{4}$ inches

eastward of the different towns and the mountains in the distance, and westward, of the wide Atlantic.

Seen from a distance, Cadiz presents a magnificent display of snow-white buildings, but its appearance greatly belies it, and it is probably one of the most unhealthy cities in the world. In 1888, out of 2,829 deaths, 913 or 323 per 1,000 were from diphtheria, typhus fever, and diseases of this class. There can be no doubt that this excessive mortality is owing to the want of an adequate supply of water, and the entire absence of a proper system of drainage. The supply of water is either collected in cisterns, or brought at a great expense from Santa Maria, on the opposite side of the bay, and costs 3s 10d. per 1,000 gallons. From its almost insular position it enjoys a mild climate, the mean annual temperature being about 64° Fahrenheit, while the mean summer and winter temperatures do not vary more than 10° above and below this point.

The population in 1885 was 58,040.

Wine, salt, olive oil, and lead are the principal exports, of the aggregate annual value of about £3,500,000 sterling. The principal articles of import are coal, coffee, tobacco, and foreign manufactures, of the aggregate annual value of about £4,000,000.

About 3,850 vessels of all nationalities enter the port annually, representing an aggregate tonnage of 1,350,000 tons.

There are no special custom-house, or quarantine regulations, and no home for sailors, but there is a hospital for seamen.

There is steam and telegraphic communication with nearly all parts, and railway communication to Madrid and all parts of Europe in connection with the French railways; and to all parts of the Peninsula.

Coal.—From 5,000 to 6,000 tons of coal are usually kept in store, the price for the best Cardiff coal being from 24 to 26 shillings a ton. Coaling is performed by lighters.

Water and supplies.—Ships can obtain water from tank vessels brought from Santa Maria.* Provisions and supplies are plentiful.

Santa Maria, on the north-east shore at the mouth of the Guadalete (across which there is a bridge of boats) is a town which had a population in 1883 of 22,730; it has a considerable export trade, particularly in wine, which amounts to about £200,000 annually; steamboats ply between it and Cadiz, and it is connected by a railway with Cadiz, Xeres, Seville, Cordova, and Madrid. There

* The new waterworks are supplied from Medina Sidonia, an old Arab town.

is a telegraph station available for the Peninsula and all foreign countries. Two small *red* lights mark the entrance to the Guadalete river.

A rescue station is maintained at Santa Maria.

Telegraph station.—There is a telegraph station on Cabezas hill, about $1\frac{1}{2}$ miles to the northward of Santa Maria.

Puerto Real, on the mainland at the head of the harbour, has a mole; its manufactures are coarse linens, leather, pottery, vermicelli, and starch.*

Trocadero stands on the projecting point of land near forts Matagorda and Luis; the Caño (channel) runs past it to the mole of Puerto Real.

Carraca, on the main, at the north-east entrance of the Sancti Petri, is the site of the Royal dockyard and arsenal.

San Fernando stands on the eastern shore of the isle of Leon, which is connected to the main land by the drawbridge of Suazo, which crosses the river Sancti Petri; the Camiño Real, or high road from the bridge, leads through it to the Torre Gorda, and thence to Cadiz. The Royal Observatory is near this town, and considered to be in latitude $36^{\circ} 27' 41''$ N., and longitude $6^{\circ} 12' 16''$ West of Greenwich. There are here numerous flour mills and extensive salt works, and manufactories of starch, leather, and vermicelli; many of the inhabitants are employed in fishing.

At San Carlos, to the north of San Fernando, is the residence of the Captain-general, that of the Intendent of the Marine, the Government Boards, &c.

Time ball.—San Fernando mean time is shown daily by the dropping of a black ball from a staff on the roof of the Observatory at San Fernando. The ball is hoisted slowly 10 minutes before 1 p.m., and is dropped at the instant of 1 p.m. San Fernando mean time, corresponding to 1h. 24m. 49.6s. Greenwich mean time.

If, owing to any circumstance, the ball should not drop at the precise moment, it will be re-hoisted, and dropped a second time, at 1h. 10m. mean time. In thick, or foggy weather, the signal will be repeated at 2 p.m. mean time. In heavy gales the ball will not be dropped.

Docks.—Adjoining the Arsenal at Carraca there are three Government docks. No. 1 dock is 344 feet over all, and 72 feet breadth of entrance, with $19\frac{2}{3}$ feet over the sill at high water, ordinary spring tides.

* A light is proposed at Puerto Real.

No. 2 dock is 240 feet over all, and 55 feet breadth of entrance with 19 feet over the sill at high water, ordinary spring tides.

No. 3 dock is $193\frac{1}{2}$ feet over all, and 49 feet breadth of entrance with $13\frac{3}{4}$ feet over the sill at high water, ordinary spring tides.

At Trocadero there is also a dock (the Lopez), a basin, and a patent slip. The dock is 558 feet over all, and 64 feet breadth of entrance, with $24\frac{1}{4}$ feet over the sill at high water spring tides ; here there are machine, boiler makers, and coppersmiths shops, a brass foundry and smithery, and sheers to lift 60 tons. Lopez & Co. undertake the repairs of ships, machinery and boilers. The Lopez basin is 427 feet long, and 197 feet breadth of entrance. The patent slip at Trocadero will lift 500 tons.

The largest ship which has been docked was 4,500 tons.

Vessels drawing 22 feet of water can discharge alongside the wharves into waggons on rails which are connected with the general railway system to all parts of the country.

There are tugs, pumping engines, diving apparatus and experienced divers.

On account of silting up, ironclads cannot approach the royal docks, and other ships are obliged to lie in mid-stream, grounding on the mud.

CADIZ BAY.—From the town of Rota, the coast, defended by several batteries, trends eastward and southward to the rocky point and castle of Santa Catalina, and together with the Galera and Diamante shoals, and the Puercas rocks, may be considered the boundaries of Cadiz bay ; the lighthouse of San Sebastian and the town of Rota being the two extremes, San Sebastian lighthouse is $5\frac{1}{2}$ miles southward of Rota.

Depth of water in the bay is from 7 to 10 fathoms.

Banco de Rota, about a mile in extent, lies in the north-west part of the bay ; it has 4 fathoms water over it, and its southern edge is situated about $1\frac{3}{4}$ miles S. by E. $\frac{1}{4}$ E. from Rota.

LIGHTS.—**Cadiz light.**—On a bed of rocks at the western extremity of Cadiz, stands the white circular light tower of San Sebastian, surrounded by a fort. A *fixed white* light varied by a *red flash* every *two minutes* is shown from it, at a height of 146 feet above high water, and should be seen in clear weather from a distance of 18 miles.*

Las Puercas light.—From the stone beacon on Las Puercas

* A semaphore is proposed.

rocks, which is painted black and white in horizontal bands, is exhibited at an elevation of 16 feet above high water, an *occulting white* light, visible *ten seconds* and eclipsed *twenty seconds*. This light, which is not always to be depended on, should be seen from a distance of 4 miles.

Santa Maria lights.—At the entrance of the Guadalete river are two iron columns, 47 yards apart, from each of which, at elevations of 25 and 15 feet above high-water level, is exhibited a *fixed red* light; visible in clear weather from a distance of 3 miles. These lights are not always to be depended on.

Rota light.—On the mole of Rota, a *fixed white* light is exhibited.

Tides.—It is high water, full and change, at Rota, at 1h. 24m.; springs rise 12½ feet, neaps 8 feet.

Torpedo caution.—A red flag with a white T, hoisted on the flag-staff at fort St. Sebastian (on the south side of the town), indicates that a torpedo is anchored near, close to which there will be a buoy, painted red and white in vertical stripes, with a staff terminating in two rings, also with red and white vertical stripes. The flag-staff on the fort, the torpedo and buoy will be in line. At night a *red* light will be substituted for the flag, and will throw a ray to within 100 yards of the buoy. No boat or vessel should approach within 100 yards of the buoy or line between the buoy and fort. Should there be more than one torpedo, each will be marked with a buoy.

The above-named flag hoisted on any boat or vessel signifies that there are torpedoes on board, or that they are operating with some, and it is strictly forbidden to go alongside any such boat or vessel.

Outside anchorage.—Should it be desirable, vessels may anchor in 10 or 11 fathoms water, with San Sebastian lighthouse bearing about S.S.E. distant 2½ miles nearly, and fort Santa Catalina in line with Xeres hill about East. In this position, should the wind veer to the south-west, as it does generally in winter, a vessel will be to windward of the entrance to the harbour. In summer a vessel may anchor more to the north-east, there being no danger then of sudden gales, and as the wind generally draws off the land in the mornings at that season, the vessel will be more to windward, and in a better position for entering the bay. The strongest winds are those from East and S.E.

Winds.—The sea breezes vary from West to N.N.W., and are generally strongest at the full and change of the moon, when they not unfrequently blow during the whole night. They set in most

commonly with the flood, and are of less strength when the tide makes near noon, indeed at that period calms are not uncommon throughout the day. The land wind seldom reaches the anchorage, although above Puntales castle there is scarcely a night without it.

The S.E. and East winds are most dreaded by the inhabitants, but they are by no means so destructive in their effects as the S.W. and Westerly gales, which send a heavy sea into the bay; whereas the East, being an off-shore wind, seldom creates any swell of consequence. These winds most commonly set in at the full and change of the moon, particularly the former, and blow with great violence; they are seldom known in the winter months, and generally commence in May or June, with intervals of a fortnight or three weeks, and their average duration is three days, but at times five.

The sensation occasioned by these winds is oppressive in the extreme; the stronger it blows the warmer the wind, and the atmosphere is always impregnated with particles of sand. The thermometer rises 10 or 12 degrees in a few minutes after it has set in, averaging from 84° to 92° Fahrenheit, and there is a singular circumstance connected with it, viz., that the temperature between decks is but little affected.

The inhabitants consider that when the hills of Ronda appear near and distinct, it is a sign of an easterly wind, but there are exceptions to this rule. It may however be considered almost to a certainty, that when the hills have the above appearance, an easterly wind exists in the strait of Gibraltar. Whenever there is any southing in the wind, the atmosphere is always hazy; and if to the westward of South a dampness ensues, but if to the eastward of South it becomes hot and dry.

Tides.—It is high water, full and change, at Cadiz, at 1h. 56m.; springs rise 12 feet, and neaps 9 feet. The tides are generally regular, except in winter after a series of westerly gales, which not only forces a large quantity of water into the port, but causes the time of high water to be 2h. later than ordinary springs, and the flood to run eight hours, and the ebb only four. At the entrance of the channel the first of the flood sets to the S.S.E.; at half tide directly through towards Puntales: and the last quarter, from the lighthouse towards Santa Maria. The ebb sets nearly from the opposite directions. In the anchorage off the city, the first hour of flood, and the last hour of the ebb, generally sets from St. Felipe point towards Santa Maria, and the remainder of the tide in a S.S.E. and N.N.W. direction.

When in the vicinity of El Frayle, Puercas, and Cochinos, especially with a beating wind, it should be borne in mind that the tidal stream sets strongly over these dangers. The velocity of the stream at springs is from $1\frac{1}{2}$ to $2\frac{1}{4}$ miles an hour, and at neaps from one to $1\frac{1}{4}$ miles.

Pilots are generally found off the port of Cadiz, but vessels cannot depend on finding them at night.

Life-boat.—There is a life-boat and rocket apparatus at Cadiz.

Telegraph cables.—There is a submarine cable to Tenerife, and the first section, commencing from the creek between Bermeja point and Cañuelo del Puerto, on the northern side of Cadiz bay, is marked by a buoy moored with San Sebastian lighthouse bearing S. 40° E., distant $5\frac{1}{4}$ miles.

The buoy is painted red, with J. R. G. T. telegraph on it in white letters. Mariners are cautioned not to anchor in the vicinity.

There are also submarine cables to Villa Real and Gibraltar.

DANGERS.—From the light tower of San Sebastian the reefs extend nearly 4 cables westward, and nearly $1\frac{1}{4}$ miles to the south-west of it there are only $3\frac{1}{4}$ fathoms water, and at 6 cables, in the same direction, there are only $1\frac{1}{4}$ fathoms. At nearly 4 cables N.W. $\frac{1}{4}$ N. from the light tower is the Olla shoal, having one fathom water over it, with Santa Catalina castle in line with the centre of the Puercas rocks; and the high house at San Fernando, half open of the sea bastion at the lighthouse.

Los Cochinos are two small black rocks which uncover at half tide, lying a little over one mile N.N.E. $\frac{1}{4}$ E. from San Sebastian light tower, and with the two small steeples of the Carmelite convent in line, at the west end of the Alameda. Shallow water extends nearly half a mile south-west of them. These are marked by a black beacon.

Las Puercas are a cluster of rocks lying E. by S. and W. by N. nearly three-quarters of a mile off the north extreme of Cadiz, and half a mile eastward of the Cochinos. These rocks are covered at high water springs, when they are distinguished by the breakers, but they are uncovered at neap tides. A beacon lighthouse, painted black and white in horizontal bands stands on the west extreme of the Puercas.

El Frayle is a rocky shoal with 6 feet water, extending half a mile S.E. by E. $\frac{1}{4}$ E. of the Puercas, and 6 cables N. $\frac{1}{4}$ E. from the end of St. Felipe mole. After passing the Puercas rocks, caution

should be observed in rounding this rocky shoal, which has on its north-east edge a black conical buoy with globe, moored in $5\frac{1}{4}$ fathoms, with San Sebastian lighthouse bearing S. 66° W., distant 2 miles, and Puerto Real church S. 56° E.

There are other rocky patches within the above dangers, rising from the shallow bank which surrounds all the northern shore of Cadiz.

El Diamante and La Galera are two rocky shoals lying at the entrance of the harbour, and covering a space of over three-quarters of a mile in a N.E. and S.W. direction. The shoalest part of the Diamante, with $2\frac{1}{2}$ fathoms water over it, lies with the flag staff of Santa Catalina castle in line with the easternmost part of Xeres hill; the northern part of Puerto Real in line with the southern hill of Medina; and the Puercas rocks, in one with fort Santa Catalina, at the north-west angle of Cadiz. From the depth of 4 fathoms at the southern end of this shoal to the same depth near the Puercas, the distance is about two-thirds of a mile across, with 6 fathoms water in mid-channel, and forms the south-west entrance into the harbour. The southern edge of El Diamante is marked by a red boat buoy, with ball, moored in 6 fathoms, with San Sebastian lighthouse bearing S. 40° W., distant nearly 2 miles, and Puerto Real church S. 53° E.

The Galera to the north-east of Diamante has $1\frac{1}{2}$ fathoms water over it, and is separated from Diamante by a narrow channel. Between this shoal and Santa Catalina point, about a mile apart, there are $5\frac{1}{2}$ fathoms water in mid-channel, which forms the north entrance into the harbour. A black buoy lies in $5\frac{1}{2}$ fathoms water, and is moored northward of La Galera, with San Sebastian lighthouse bearing S. 46° W., distant $3\frac{1}{6}$ miles, and Puerto Real church S. 42° E.

Cabezo de los Asnos is a shoal spit with $1\frac{1}{2}$ and 2 fathoms over it, extending $1\frac{1}{4}$ miles, in a south-westerly direction, from Rota, and between it and the shore are several rocks and very shoal patches. It is marked on its south-east side by a red conical buoy.

DANGERS WITHIN THE HARBOUR.—From the Puercas rocks the edge of the shallow bank trends eastward round the Frayle shoal, and thence along the whole shore of Cadiz, forming to the southward of Puntales castle a wide expanse of black mud with shallow water over it. That part of the bank on the north side of Puntales castle is named St. Domingo bank (Palma shoal). On the eastern shore from Santa Catalina castle, the whole space southward to fort Matagorda is one extensive flat. The southern part of this flat is called Cabazuela shoal, and its edge northward of Matagorda fort is

marked with a red buoy, in $3\frac{1}{2}$ fathoms, with Puntales castle S.S.W. distant $1\frac{1}{10}$ miles, and the extremity of San Felipe pier N.W. $\frac{1}{4}$ W. The high tower San Fernando on with the north end of Matagorda, bearing S. by E. $\frac{1}{2}$ E., leads along the western edge in 3 fathoms water, and with the tower open westward of the fort there is not less than 5 fathoms.

Los Corrales is an extensive rocky shoal, which extends from the shore at the ditch of the land port of Cadiz, about a third of a mile, and then trends southward, uniting itself to the shore at nearly a mile from its commencement.

St. Domingo bank (Palma shoal).—The shallow ground between the Corrales shoal and Puntales castle is named the St. Domingo bank. It extends off nearly three-quarters of a mile, and on its outer edge there are 3 fathoms water, sand, marked by a black buoy, which lies in $4\frac{3}{4}$ fathoms, with Puntales castle bearing S. by W., 8 cables, and the extremity of San Felipe pier N.W. by N.

CAUTION.—Entering Cadiz harbour, the black buoys and beacons must be left on the starboard hand, and the red buoys on the port hand. The positions of the buoys cannot always be relied on, and they are sometimes missing.

Directions.—Vessels entering Cadiz harbour between the Puercas rocks and Diamante shoal, should keep Medina Sidonia and Puerto Real steeples in line, bearing S.E. $\frac{3}{4}$ E. (*see* view B, on chart 86), and if Medina Sidonia church cannot be seen, Puerto Real church should be brought in line with the highest point of Monte de Medina, which is nearly always visible, until the gates of St. Domingo open of the low point of Phillip, which has a flagstaff and saluting battery on its extremity, or the small mole—named the mole of Seville gate—is seen open of the point; when the lead will be a sufficient guide, and a convenient anchorage may be taken.

Working in, the Diamante should not be approached nearer than to bring the south end of Medina in line with the north end of Puerto Real. In standing to the southward the north end of Medina should not be opened southward of the south end of Puerto Real.

North channel.—Vessels entering Cadiz harbour by the North channel, or between the Galera shoal and Santa Catalina castle, should steer with Puerto Real church steeple in line with the southern hummock of Marrucco hill, S.E. $\frac{2}{3}$ S., until St. Domingo steeple in Cadiz is well open eastward of St. Felipe point, when a vessel will

be within the shoals. If turning in, do not open any part of Marrucco hill north or south of Puerto Real.

Anchorage off the city.—The best anchorage for vessels of moderate size, is with the Barracks (in ruins) on the isle of Leon, touching or on with Matagorda fort, and the dome of the Cathedral twice or thrice its apparent breadth open east or west of St. Domingo gates, in 5 to 6 fathoms mud. Small vessels and coasters lie nearer the city. Large vessels should anchor farther out, with the high house—the first large building north of the tower—at San Fernando, a little open west of Matagorda fort; and the Cathedral open eastward of St. Domingo gates.

Vessels proceeding up the harbour after having opened St. Domingo gates of St. Felipe point, should steer for Puntales castle, keeping the high tower of San Fernando open westward of Matagorda fort, and when abreast St. José church, a remarkable solitary palm tree will be seen on the summit of Martyrs hill—the first rising land eastward of Gorda tower, with two magazines on it a short distance apart—which, just touching the south gable end of a large white building at the water's edge near Santibañez mills lead clear of all the shoal water until abreast of fort Luis.

The anchorage between Puntales and the entrance to the Carraca channel is excellent, and requires no other guide than the chart and lead.

The coast from Cadiz trends in a southerly direction for 25 miles to cape Trafalgar, and as between there are several dangerous rocky shoals having from $1\frac{1}{2}$ to $3\frac{1}{2}$ fathoms water over them, and lying from 2 to 3 miles from the shore, vessels of heavy draught should not stand nearer than about 5 miles, or into less than 15 fathoms water, during fine weather, and 6 or 7 miles when there is any sea or unsettled weather. In rounding the dangers surrounding the north-west end of Cadiz, a vessel should not steer to the southward until the town of Rota bears eastward of N. by E., so as to avoid the $3\frac{3}{4}$ fathom patch on the tail of the bank S.W. nearly $1\frac{1}{2}$ miles from the lighthouse.

Channels inside the several dangers between Cadiz and cape Trafalgar are used by coasters and even larger Spanish vessels, but none than those locally acquainted should go inside the shoals. Should however, the mariner from any particular motive do so, the vessel's position should be constantly checked, the lead kept going, and the tide considered. The flood runs strong to the northward, and the ebb to the southward.

Leon bank is about $2\frac{1}{2}$ miles southward of San Sebastian lighthouse, and its western edge $2\frac{1}{4}$ miles from fort San Fernando. The shallow part of the bank, over a space of about three-quarters of a mile, has from $2\frac{1}{4}$ to $3\frac{1}{4}$ fathoms water over it, and there are 11 fathoms at about half a mile outside it. The marks for it are Xeres bluff a little open northward of St. José church, having three towers, and Torre Vista at Chiclana in line with Gorda tower.

Gorda tower, named also the tower of Hercules, is round, with a battery at its base, and stands on a small sand-hill about $5\frac{1}{2}$ miles southward of the lighthouse. Care must be taken not to mistake it in thick weather for the lighthouse, as the coast here is everywhere low.

Martyrs bank lies southward of the Leon bank, fronting the shore and parallel to it, between the Torre Gorda and the south end of the isle of Leon, and about $2\frac{1}{4}$ miles distant from the coast. It is $3\frac{1}{2}$ miles in length, and has from $3\frac{1}{4}$ to $4\frac{3}{4}$ fathoms water over it.

Sancti Petri river, which separates the isle of Leon from the mainland will only admit vessels of light draught, as at its mouth there are only about 3 feet at low water. At the entrance is the islet of Sancti Petri, having a fort and square tower on it, surrounded by rocks and sandbanks, over which the sea breaks heavily when there is any swell ; the islet is $5\frac{1}{2}$ miles southward of Gorda tower.

Bermeja tower is a round tower, $1\frac{1}{2}$ miles eastward of Sancti Petri islet ; it stands near the beach, at the east end of a portion of coast of reddish colour, level on the top and steep towards the sea, a little higher than the land westward of it, and covered with fir trees, being part of the wood of Barrosa. A little north of this tower, in the middle of the trees, will be seen a white house named Coto, and near it a remarkable tree higher than those in the neighbourhood. At $1\frac{1}{2}$ miles southward of the tower of Bermeja is a large white building named Barrosa.

HASTE AFUERA SHOAL.—Lying in a S.W. by W. direction from fort Sancti Petri, is the north end of a narrow rocky bank, which runs to the southward for about 2 miles, parallel to the coast and at the distance of nearly $3\frac{1}{4}$ miles from it. The general depths on the bank are from 3 to $4\frac{1}{2}$ fathoms, but near its north end is a shallow patch with only $1\frac{1}{2}$ fathoms water over it, called the Haste Afuera shoal, which lies S.W. $\frac{3}{4}$ W. distant $1\frac{9}{10}$ miles from fort Sancti Petri, and N.W. $\frac{3}{4}$ N. 6 miles from cape Roche.

At eight-tenths of a mile southward of the Haste Afuera is another shoal with 3 fathoms over its shoalest part, named Mogote. There are 12 fathoms water at about half a mile outside the bank, and as the swell rolls heavily over it, and the sea occasionally breaks, vessels should give it a wide berth.

CAPE ROCHE, at about $5\frac{1}{2}$ miles southward of Bermeja tower, is somewhat low, steep, of a red colour, and has a square tower on it. From the tower of Bermeja the land gradually rises to the height of the cape, and the shore all along is a flat beach until within $1\frac{1}{2}$ miles north of the cape, whence commence the cliffs of Castillejos. At nearly $2\frac{1}{2}$ miles north of the cape is the tower of Puerco, and half a mile to the N.E. of the tower is a little hill. On the east side of the cape, the little river of the same name runs into the sea.

MARRAJOS SHOAL.—This is a rocky shoal, $1\frac{1}{2}$ miles in length, lying in a N.N.W. and S.S.E. direction, over the shoalest part of which there are only $2\frac{1}{2}$ fathoms water. From its north end Puerca tower bears E. $\frac{1}{4}$ N., distant nearly $2\frac{1}{2}$ miles, and cape Roche S.E. $\frac{1}{4}$ E. $3\frac{3}{10}$ miles; and from the depth of $3\frac{1}{2}$ fathoms at its south end, cape Roche bears S.E. by E. $\frac{1}{4}$ E., nearly $2\frac{1}{2}$ miles. The sea generally breaks over it. In passing between this shoal and the land, the town of Conil should be shut in with cape Roche. There are a few scattered patches with $3\frac{3}{4}$ to $4\frac{1}{4}$ fathoms over them, northward of the Marrajos and between the bank south of the Mogote shoal and the land.

CAPE ROCHE SHOAL is $1\frac{1}{2}$ miles in length N.W. and S.E. immediately off the pitch of the cape, which bears E. $\frac{1}{4}$ N. distant one mile from the shoalest part. The shoal has from $2\frac{3}{8}$ to $4\frac{1}{4}$ fathoms water over it, and 6 fathoms between it and the cape.

Conil.—This town stands on rising ground $2\frac{3}{4}$ miles south-east of cape Roche; its church steeple is conspicuous, and east of it on the summit of a hill are several windmills, and on its south is the little river of the same name, which admits small craft at high water, but they lie dry when the tide is out. Thence the coast trends southward for $6\frac{1}{2}$ miles to cape Trafalgar; between are the towers of Castilobo and Blanca, the former is square and in ruins, the latter is round and white. The shore all along is a flat beach backed a little inland by hills, varying from about 300 to 650 feet high.*

* The tunny nets, between cape Roche and Conil, are laid from about one-third to one-half of a mile from the coast.

CONIL SHOALS.—Between Conil and cape Trafalgar, at about $1\frac{1}{2}$ miles from the shore, are two rocky shoals, called the Little and Great Conil, on which the water breaks when there is any sea. They lie parallel to the coast, with irregular depths on them of from $1\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, and the two together extend over $2\frac{1}{2}$ miles. The Little Conil on the north is separated from the Great Conil by a passage a quarter of a mile wide, with 9 fathoms water.

From the north extreme of these shoals the tower of Atalaya de Conil bears N.E. distant 2 miles, and Castilobo tower East $1\frac{1}{6}$ miles; from the south extreme Blanca tower bears E.N.E. $1\frac{1}{2}$ miles, and cape Trafalgar lighthouse S.E. $\frac{3}{4}$ S. $3\frac{1}{4}$ miles.

CAPE TRAFALGAR is a low steep sandy point having a tower and lighthouse on it, and being separated from the high land to the north-east by a low sandy plain, appears at a short distance from the north-west or south-east like an island. High table-land, divided in two, rises abruptly to the eastward of the cape at a short distance from it, and extends to the hills of Patria, which reach an elevation of about 625 feet, $3\frac{1}{2}$ miles eastward of Conil. This table-land extending north-east and south-west bears the name of the Altos de Meca, and with the white round tower on the western part, called the Torre de Meca, forms the most remarkable land on the Spanish coast westward of Gibraltar.*

The site on which the tower stands, in whatever direction it may be seen from seaward, presents almost always the same appearance; its colour is dark, and on its northern part there are some sandy patches, which contrast well with the green hue of the surrounding land. From the tower of Meca, the table-land trends in the direction of the tower of Tajo declining gently on approaching the sea, where it terminates abruptly to a steep cliff, the whiteness of which is remarkable. The table-land formed by Altos de Meca extends also to the north for some distance, and preserves its height as far as the town of Vejer, which stands 725 feet above the sea, $5\frac{1}{2}$ miles N.E. by E. from cape Trafalgar lighthouse. This town can only be seen from Barbate bay, but the windmills are visible on a hill a short distance south-west of the town.

Current.—See foot note.

* See Admiralty chart:—Strait of Gibraltar, No. 142; scale, $\pi = 0.7$ inches.

Chapter VII. of this volume, being in part identical with Chapter II. of Mediterranean pilot Vol. I., the mariner should consider which book contains the later information.

Current.—"Midnight, shaped course to pass 13 miles off cape Trafalgar, having bearings of C. Spartel and Tarifa light. At 3 a.m., soundings and bearings placed the ship 4 miles off Trafalgar light, so that we had been set directly towards it, 9 miles in 3 hours."—Navigating Officer's remark book, H.M.S. *Arab*, 1885.

LIGHT.—The lighthouse on cape Trafalgar is conical, built of white stone with a red and yellow dome, and exhibits at 168 feet above the mean level of the sea, a *fixed white* light, varied by a *flash* every *twenty-five seconds*, and visible in clear weather from a distance of 19 miles. It bears N. $\frac{1}{2}$ E. 24 miles from cape Spatel; N.W. $\frac{1}{4}$ W. 11 $\frac{1}{2}$ miles from cape Plata; and S. by E. $\frac{3}{4}$ E. 8 $\frac{1}{2}$ miles from cape Roche.*

Tides.—It is high water, full and change, near Conil, 6 miles northward of cape Trafalgar, at 1h. 18m.; springs rise 12 feet, and neaps 7 $\frac{1}{2}$ feet.

The **ACEITERA** is a dangerous rocky shoal, on the west side of cape Trafalgar, a mile in length, N. by W. and S. by E., having from about 3 to 20 feet of water over it, and on which many vessels have been wrecked. From the depth of 4 fathoms, at its north extreme, the lighthouse on cape Trafalgar bears East, distant 1 $\frac{3}{4}$ miles; and from a depth of 5 fathoms on its south extreme, the lighthouse bears about N.E. by E. $\frac{1}{2}$ E. 2 miles.

The south end of the Aceitera is connected with cape Trafalgar by a rocky ridge about a quarter of a mile wide, over which the general depths are 2 $\frac{1}{2}$ to 5 fathoms, but there are two shallow patches, one named the Piles, with 2 $\frac{1}{2}$ fathoms water on it, at about 1 $\frac{1}{4}$ miles from the lighthouse; and the other the Animas, with one fathom on it, at half a mile from the lighthouse.

None but small vessels, under favourable circumstances, should therefore pass between the Aceitera and the cape, as over the rocky ridge there is a race about half a mile in extent, caused by the unevenness of the ground and the effect of counter streams.

The **MECA** is a rocky shoal covered with a slight layer of sand, with from 2 $\frac{1}{2}$ to 5 fathoms water over it, which extends in a N.N.W. and S.S.E. direction 1 $\frac{1}{4}$ miles. From the north-west end in 5 fathoms, cape Trafalgar lighthouse is in line with Tajo tower bearing E.S.E., distant 3 $\frac{1}{4}$ miles; and from the south-east end, the lighthouse is in line with a white sandy patch named Boqueron between the lighthouse and Tajo tower.

Trafalgar or Phare bank to the south-west of the Meca is a rocky bank, over which there are 7 to 10 fathoms water. From its centre the lighthouse is in line with Meca tower, bearing E. by N. $\frac{1}{2}$ N., distant 4 $\frac{3}{4}$ miles.

* Reported to appear as a fixed light with a flash about every 15 seconds.

In about the same direction, 15 miles from the cape, is another shoal, called the Little Phare, on which is a depth of 9 fathoms, with 13 to 26 fathoms round it.

Anchorage.—From cape Trafalgar the coast trends in an easterly direction, with a slight bend to the northward, forming a bay with a sandy beach, terminating in cliffs, on which, at 3 miles from the cape, is the tower of Tajo, 150 feet above the sea. Nearly midway between the cape and the tower there is a small white guard-house, seen at some distance, and off the house, at 2 to 3 cables from the shore, is a reef named the Cañaveral, which, uncovering at low water, protects the little cove of Baradero de Meca, where there is good landing. In this bay vessels may anchor with northerly winds, in any convenient depth, sheltered from the north-west swell.

A good berth will be found off the Baradero de Meca, in 8 or 9 fathoms, with a break or cut in the heights of Meca bearing N.E. $\frac{1}{2}$ E., and to the south extreme of the cliffs, on which is the tower of Tajo, about E. by S. $\frac{1}{2}$ S.

Coasting vessels find shelter from easterly winds between cape Trafalgar and Castilobo tower, close to the shore, in about 6 fathoms sand, but when the wind draws northward of N.E. the former anchorage is the safer.

BARBATE BAY.*—At 3 miles eastward of Tajo tower is the mouth of the river Barbate, and $1\frac{1}{2}$ miles farther on is a coast-guard house; the shore between forms a bay about a mile deep, named Barbate. From the tower the land becomes lower, and changes to sandy ground, as the mouth of the river is neared; the shore under the cliffs of the tower is clear of danger and steep-to, but from a little beyond it to the mouth of the river, reefs extend off about a third of a mile; and at three-quarters of a mile off the coast-guard house, in the eastern part of the bay, is the Sara shoal, with $3\frac{3}{4}$ fathoms water over it.

The river Barbate, after winding through a deep valley, runs into the sea between low sandy banks; there are $3\frac{1}{2}$ feet over the bar at low water, but at high tide the banks at the entrance are overflowed, when its mouth appears wide. The village of the same name stands on the right bank, about three-quarters of a mile from the entrance. A large extent of white sandy ground, between the cultivated land east of the Tajo tower and the river known as the Picacho de Barbate, is conspicuous, and serves as a mark for the Cabezos shoals.

* The tunny fishing nets are laid about three-quarters of a mile from the shore.

Depth of water.—There are $3\frac{1}{2}$ feet over the bar of the river Barbate at low water.

Anchorage.—Coasting vessels which frequent Barbate anchor in the river on its western shore, off the houses, in $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms water ; but those unable to cross the bar anchor in any convenient depth, southward of it, where they ride safely with northerly winds but this anchorage is not safe should the wind blow from seaward.

Between cape Trafalgar and Tajo tower the soundings are very irregular, there being rocky patches of 9 and 10 fathoms, with 12 and 20 fathoms, sand, between, at $1\frac{1}{2}$ and 3 miles off shore.

The coast.—From the mouth of the river Barbate the shore is low and sandy, and trends to the south-east for 6 miles to cape Plata. About $2\frac{1}{2}$ miles beyond the coast-guard house before mentioned is the tower and village of Sara or Zahara. Between these is mount Retin, a hill of an irregular form with several peaks, which is seen at some distance, and then appears like a bold headland, having on its slope two large ancient towers. On the east side of the hill the land is level, and a small stream runs into the sea between its foot and the village of Sara ; this stream flows from the laguna de la Janda, an extensive sheet of water lying nearly parallel with the coast, and about 3 miles from it.*

Cape Plata is of moderate height, but appears low from the near vicinity of the sierra de Plata from which it descends. A reef extends off about 2 cables from the point, some of the rocks of which are high and remarkable. There is a coast-guard station on the cape.

Point Camarinal, at $4\frac{1}{2}$ miles southward of Sara, is low, salient, and skirted by rocks, for some distance off ; it is backed, as is also the point north of it, by the sierra de Plata, the north-western hills of which rise from the level land of Sara. On one of the heights over Camarinal point, at some elevation above the sea, there is a circular tower ; on the point north of it is Gracia square tower, not so high as the former, and at the foot of it a small white coast-guard house ; whilst at a little distance from the sea and to the north of the latter tower there are several white buildings. Between the two towers is a sandy beach.

The steep ridge of the sierra rises to a height of 1,567 feet at a distance of 3 miles E.N.E. from Gracia tower, and is named the Pope's chair, or Silla del Papa.

* The tunny nets off Sara are laid about half a mile from the shore.

From Camarinal point on the west, an extensive white sandy patch extends across the foot of the mountain to Bolonia bay, and is seen at some distance from seaward. From this mountain the land eastward is of considerable elevation all along the north shore of Gibraltar strait.

Anchorage.—The coast between Sara and cape Plata is named the bay of Sara; the bottom is sandy, but not clear of rocks, and here vessels will find shelter from strong easterly winds. The best anchorage is westward of cape Plata, at a short distance from the shore; but the mariner must be prepared for the heavy squalls which come over the land. In front of the sandy beach north of cape Plata there are rocky patches close to the shore, outside of which the holding ground is indifferent. Coasters also find shelter off a small beach between Camarinal point and cape Plata. This is a convenient anchorage when easterly winds prevent vessels getting through the strait of Gibraltar, but it is exposed to winds from the south-west, and partly from the north-west, and must be left immediately the Levanter or easterly wind subsides.

Bolonia bay, on the east side of point Camarinal, is about three-quarters of a mile deep; it has a sandy beach, and at its head is a small town of the same name, a coast-guard station, and the ruins of the ancient town of Belon. The bay affords good shelter from winds from N.W. (round northward) to East, in moderate depth, at about $3\frac{1}{2}$ cables from the shore; care should be taken to ascertain the nature of the bottom, which in some places is rocky.

Mount San Bartolomeo.—From the head of Bolonia bay the coast trends to the south-east for $3\frac{1}{2}$ miles to Paloma point, with its tower, and is of moderate elevation; the point is bordered by a rocky bank, extending about a third of a mile seaward. This point is the termination of mount San Bartolomeo, or San Mateo, which at about $1\frac{1}{2}$ miles inland, rises to the height of 1,542 feet above the sea, and is conspicuous from its peculiar jagged summit, and by a long patch of yellow sand without vegetation, which commences near Paloma point, rises to about half way up the mountain, and terminates near the middle of Val de Vaqueros bay. It is known as the Picacho de San Bartolomeo, and is the most remarkable feature seen anywhere on the north shore of the strait. A small white guard-house will assist in distinguishing the look-out tower from the houses north of it.

Val de Vaqueros bay.—Between Paloma point and Peña point east of it, the shore recedes northward and forms Val de Vaqueros

bay, which is about half a mile deep. Coasters seek shelter here from north-east winds, anchoring near the beach at the head of the bay, where the holding-ground is good. Two small rivulets, on the banks of which are some houses, fall into the bay, that nearest Paloma point being the larger, and named Puerco.

Sierra de Enmedio.—To the eastward of mount San Bartolomeo is another similar mountain, the Sierra de Enmedio, 2,191 feet high not so broken or remarkable, but more isolated; from the westward some small peaks appear a little above the main body of the mountain, not very conspicuously, but known to the local navigators. The Sierra de Enmedio, called also Peña, slopes in declivities to the south, and forms Peña point, which terminates abruptly in a remarkable conical, and apparently isolated rock, on which is a tower reached by the ascent of 84 steps. Seen from the westward, the tower and rock appear to be detached, and stand out in bold relief from the high land.

Sierra de Nuestra Señora de la Luz.—To the north-east of the Sierra de Enmedio, is the lofty chain of mountains named Nuestra Señora de la Luz, which declines gradually to the coast and terminates at Tarifa. The summit of this range is moderately even, and presents nothing remarkable, with the exception of two peaks near each other, which are 7 miles inland, 2,431 feet above the sea level, and named by the local mariners las Tetras (the Teats).

Lances de Tarifa.—From Peña point to Tarifa, a distance of 4 miles, the shore forms a sandy beach named Lances de Tarifa. The little rivers Salado and Vega here run into the sea; several buildings are scattered along the base of the Enmedio; and in the plains of Salado, a coast-guard house stands on the shore about half a mile south-east of Peña tower. A bridge crosses the Salado at a short distance from its mouth.

DANGERS.—The CABEZOS is the general name of a cluster of dangerous rocky patches lying westward of Tarifa, and nearly midway between it and cape Plata. There is as little as one foot of water on these dangers, over which the sea breaks with great violence during strong westerly winds; but in calms or easterly winds a ripple with dangerous eddies is all that is seen. These shoals are separated from each other by deep water; they are steep-to, and consequently the lead gives little or no warning, hence a wide berth should be given them.

Placer Nuevo or Luyando bank, the southernmost of these dangers, is a bed of rocks about three-quarters of a mile long in an

east and west direction, with 9 fathoms over it. From its east end Poloma tower bears N.N.E. $\frac{1}{4}$ E., distant about $3\frac{1}{4}$ miles; and Tarifa lighthouse E.S.E. $6\frac{1}{4}$ miles. A heavy swell rolls over the bank during strong westerly winds, and therefore a wide berth should be given to it.

Piedra Verde or eastern shoal, the principal danger, having only one foot over it at low water, is separated from Placer Nuevo by a narrow channel having 20 fathoms water. It lies $2\frac{1}{2}$ miles from Paloma point, with Tarifa lighthouse bearing S.E. by E. $\frac{1}{4}$ E., distant 5 miles; Peña tower N.E. by E. $\frac{3}{4}$ E. $3\frac{1}{2}$ miles.

Placer del Oeste or **del Puerco** is another rock bank, and the most western of these dangers; it lies about $1\frac{1}{2}$ miles in a N. by W. direction from Placer Nuevo, and has 9 fathoms water over it. Close on its west side there are from 18 to 24 fathoms.

Bajeta de Tierra is a dangerous rocky patch, with only 5 feet water over it, in the channel between the Cabezos and Peña point. It lies $1\frac{1}{4}$ miles from the shore, with Peña tower bearing N.E. by E., and Tarifa lighthouse S.E. $\frac{3}{4}$ S. 4 miles. In S.W. gales the sea breaks heavily on the shoal, and at other times there are strong eddies and ripples over it. There are irregular soundings, 6 to $3\frac{1}{2}$ fathoms, between it and the shore; and from 10 to 20 fathoms between it and the Cabezos.

The anchorage westward of Tarifa, off the Lances de Tarifa, is good and sheltered from easterly winds. It is, however, exposed to heavy squalls from the north-east, but as the holding ground is good and the sea smooth, vessels ride easily. Landing on the beach is easy. Vessels should leave the anchorage when the easterly wind subsides.

Directions.—Coasters and small steamers, in order to avoid the sea and the strength of the easterly winds, when bound westward, and also in working to the eastward, usually pass between the Bajeta and Peña point. Nevertheless, the channel between the Bajeta and Cabezos is preferable, being $1\frac{1}{2}$ miles wide with deep water, regular soundings, and current direct. The leading mark through in mid-channel is Tarifa lighthouse in line with mount Acho of Ceuta; when Peña tower is in line with the two peaks of Nuestra Señora de la Luz, a vessel will be between the Cabezos and Bajeta. To avoid the Bajeta, the sierra Bullones or Apes hill; on the African coast, should not be shut in with the south extreme of Tarifa peninsula.

To pass southward of the Cabezos, keep the Picacho de Barbate (the white sandy ground east of Tajo cliffs, page 404) well open of cape Plata, until the peaks of Nuestra Señora de la Luz are open eastward of Peña tower; or do not bring cape Plata to bear westward of North, until Tarifa lighthouse bears E. by S. $\frac{1}{2}$ S., when the lighthouse may be steered for.

TARIFA, formerly an islet, is now a small peninsula, joined to the main by an artificial causeway. It is level and moderately high, and surrounded by steep cliffs with deep water close to, except on the southern side, where a reef, with $3\frac{1}{2}$ fathoms water on it, extends the distance of a cable; half a cable from the shore, W. $\frac{1}{2}$ N. from the lighthouse, one of the rocks uncovers at low tide; and a cable from the shore in the same direction the depth is only 2 fathoms. The lighthouse, some small batteries, barracks, magazines, and other buildings are erected on the peninsula, and on its north-west side there is a small artificial harbour for fishing craft.

The town and arsenal of Tarifa, ancient Julia Joza, stands on the shore a short half mile N.E. of the peninsula; it was built by the Moors, and is surrounded by a wall flanked by several towers, the principal of which at its south-west angle is called the castle of Guzman. Santa Catalina, a fort on rising ground on the causeway or neck of the peninsula, is surrounded by sand, and appears isolated.*

Tarifa is a military port of some importance; it has some tanneries and potteries, and an active fishery of tunny and anchovy.

LIGHT.—The lighthouse of Tarifa is a white circular tower 112 feet high, and stands at the south end of the peninsula. It exhibits at 130 feet above high water, a *fixed red* light, visible in clear weather from a distance of 20 miles. The light is obscured inshore of the bearing W. $\frac{1}{2}$ S., but this does not cover the Pearl rock, and is therefore of no use as a guide to clear it.†

Life-saving apparatus.—There is a rocket apparatus at Tarifa.

Caution.—On the importance of using the lead when approaching Tarifa. See page 16.

Vessels passing within gunshot of the fortress should show their colours, and by night a light; vessels failing to do so are liable to the risk of being fired at.

* There is a semaphore on the western turret of the Castle of Guzman.

† The colour of Tarifa lighthouse has been reported to be red, with a white horizontal stripe just under the lantern. See Berlin notice to Mariners, No. 10, of 1889.

Tides.—It is high water, full and change, at Tarifa, at 1h. 46m.; springs rise 6 feet, and neaps $3\frac{1}{2}$ feet. The flood stream sets to the westward, and the ebb to the eastward.

The anchorage, on the east side of Tarifa, between the peninsula and Camorro point, is near the beach, for the bottom is shelving, and there are 5 fathoms water at 2 cables from the shore. Coasters, and particularly lateen vessels that can readily make sail, are the only kind of vessels that can frequent the anchorage with confidence, Camorro point being difficult to clear should the wind shift to the southward. Large vessels will find temporary anchorage about one-third of a mile from the shore, in 8 to 10 fathoms, sand and gravel; but should the wind shift to the south-west, when it generally blows hard, this anchorage would be exposed, and a vessel should leave. Less than a mile to the south of Tarifa there are about 100 fathoms.

Camorro point, about a mile north-east of the peninsula, is high, steep, and of a whitish colour; seen from the westward it is readily distinguished. There are several rocks on the shore between the point and the town, with from 6 to 9 feet water between them, where small craft load and unload. A large vessel should give this point a berth of $1\frac{1}{2}$ or 2 cables.

The coast from Camorro point trends eastward for 9 miles to Carnero point at the entrance to Gibraltar bay. It is generally composed of cliffs separated by sandy beaches, with ledges of rocks which do not extend far off, and backed by gentle undulating hills, upon which are numerous farms and cultivated ground. Behind these hills the land becomes mountainous, reaching 1,774 feet above the sea, and forming part of the range of Nuestra Señora de la Luz. Gualdamesi point, $4\frac{1}{2}$ miles from Tarifa lighthouse, is a dark bold cliff with a tower, and on its north-east side is a valley through which a small stream runs into the sea.

Tolmo bay, with a white sandy beach scattered with rocks, is 2 miles eastward of Gualdamesi point; Acebuche point, the east extreme of the bay, is low, and although projecting but little can be distinctly made out. A short distance outside are several rocks, some of which are nearly awash at low water. A castle, in ruins, stands upon a hillock near the head of the bay, about which are some country houses, and two guard houses near the beach, towards Gualdamesi point. The bay affords good anchorage for small craft with off shore winds.

Frayle point, nearly a mile beyond Acebuche is bold, and the

termination of high land which rapidly declines from an elevation of nearly 1,000 feet ; a white house stands above the cliff, and a square tower upon the summit a little west of it. Off the point are several rocks, one of which from its size and shape gives to the point the name of Frayle or Friar. Thence to Carnero point is a succession of rock and sand for above $1\frac{1}{2}$ miles. A small bight with a beach named Cala Arena lies to the eastward of Frayle ; off its eastern point which separates it from a similar bay, are some rocky heads which project for some distance. Cala Arena offers shelter to coasters from north-west winds, and will be recognised by a house near a stream upon the east side ; there is also another surrounded by wood upon the slope of the hill, half a mile to the northward.*

CARNERO POINT.—This is a broad projection sloping (from the mountains within) towards the south-east, and forms the western entrance to the bay of Gibraltar ; the shore is bordered by rocks, but a bight between it and point Secreta, half a mile to the westward, is resorted to by fishing boats. Off the southern extremity of the point is Cabrita rock always above water, and conspicuous above the several others which appear when the tide is out. Upon the summit north-west of Carnero point is a square tower, and a lighthouse upon the point below it.

LIGHT.—The lighthouse on Carnero point is painted yellow, and exhibits at an elevation of 135 feet above high water a *fixed green* light, visible in clear weather from a distance of 11 miles, between the bearings of S. $\frac{3}{4}$ W. through West and North to N.E. by E. $\frac{1}{2}$ E.

Palomas island.—Nearly mid-way between Frayle and Carnero points, and about 2 cables from the shore, is Palomas or Pigeon island. It is small and low, and nearly connected with the shore by a rocky ledge over which is a passage for boats, there are also several rocks extending about $1\frac{1}{2}$ cables off the west end of the island.

PEARL ROCK, lying $5\frac{1}{2}$ cables S. by E. of Palomas island, is a dangerous rocky shoal in the way of vessels bound to and from Gibraltar bay. It lies with San Roque church in line with the inner part of Cabrita rock bearing N.E. by N. ; Gualdamesi tower in line with the outer rock off point Acebuche W. $\frac{1}{4}$ N. ; and Tarifa lighthouse W. $\frac{1}{4}$ S. This danger is formed of pinnacle rocks, having 8 feet only on the shoalest part ; the passage between it and Palomas island

* See Admiralty plan :—Gibraltar bay, No. 1,448 ; scale, $m = 2.9$ inches.

is over uneven rocky ground, the depths varying from 5 to 10 fathoms.* To pass between the Pearl rock and the shore, keep Tarifa lighthouse in line with the outer rocks off Frayle point, and with Gualdamesi tower shut in, but unless it is absolutely necessary, none but small vessels should use this passage.

Caution.—In the neighbourhood of Pearl rock and Carnero point, the tides and eddies run nearly always either north-west or north-east, and consequently will carry a vessel towards them, rendering this part of the coast the most dangerous in the strait, and resulting in many serious accidents to shipping. There are 6 fathoms $1\frac{1}{2}$ cables south-east of the rock, and above 100 fathoms three-quarters of a mile outside of it; the stream at times runs past it at the rate of 3 knots.

Clearing marks.—To pass to the southward of Pearl rock, keep Black hill (a conspicuous peak rising over the west side of Tolmo bay, with a white house nearly under it) in line with point Acebuche bearing W. by N. $\frac{1}{2}$ N.; and to pass to the eastward of the rock, bring San Garcia tower (on the point between Carnero point and Algeciras) in line with Carnero point bearing N. $\frac{1}{2}$ E.†

Directions at night.—To mark the position of the Pearl rock at night a ray of *red* light is shown from the lighthouse on Europa point, which is seen between the bearings of N.E. by E. $\frac{3}{4}$ E. and E. $\frac{1}{4}$ N., and extends half a mile southward of the rock. Therefore, in approaching the Pearl at night from the westward, a vessel should keep Europa *white* light in sight until Verde islet light, Algeciras, is seen, when she may steer to the northward into Gibraltar bay. A vessel from Gibraltar bay, or from the eastward, should open the *white* light of Europa before shutting in Verde island light.

The **BAY of GIBRALTAR** is formed between Carnero point on the west and Europa point on the east, distant from each other 4 miles. Between the points the coast recedes about 5 miles, forming a large bay open to the south. A channel of very deep water runs in for 3 miles, when the bank on either side and at the head of the bay rises although the water continues deep to the anchorages around the bay. The land on the west side of the bay is high, being the lofty range of mountains which follows the direction of the coast from Tarifa, rising over Carnero point to about 1,000 feet above the

* See Admiralty plan:—Gibraltar bay, No. 1,448; scale, $\frac{1}{2}$ inch = 2.9 inches. Two electric cables are laid inside the Pearl rock; vessels should avoid anchoring there if possible.

† See views on chart No. 1,448.

sea, continuing northward and gradually decreasing in elevation towards the head of the bay.

The town of San Roque, with a conspicuous church, stands on a hill 436 feet high, about 2 miles inland ; and to the south-east of it is mount Carbonera (with a tower on it) 971 feet high ; thence the land declines to the Neutral ground, at the termination of which rises the Rock of Gibraltar.

The inner portion of the bay has a sandy beach, interrupted by some rock points, and it receives two rivers of some importance, besides smaller streams.

LIGHTS.—Europa point light.—At the south-east extreme of Europa point, on a cliff 98 feet high, is the gray-coloured tower of Victoria, which exhibits, at 156 feet above high water, a *fixed white* light, visible in clear weather from a distance of 15 miles.

From the same tower a ray of *red* light is shown in the direction of the Pearl rock over an arc of 23° , and seen from the westward between the bearing of N.E. by E. $\frac{1}{4}$ E. and E. $\frac{1}{4}$ N.

New Mole light.—On a stone column near the extremity of Gibraltar New mole is a *fixed red* light, elevated 28 feet above the level of the sea, and visible in clear weather from a distance of 8 miles. The light shows *white* inshore between S.W. $\frac{1}{4}$ S. and N.W. $\frac{1}{4}$ W.

Ragged Staff light.—On a lamp-post at the Ragged Staff landing place is a *fixed green* light.

Verde Islet light.—At Verde islet near Algeciras a *fixed white* light is exhibited at an elevation of 62 feet above the sea, visible in clear weather, between Europa and Carnero points, at a distance of 9 miles.

Getares bay.—Carnero point is skirted by rocks, and should not be closely approached on account of the currents before mentioned. San Garcia point, the northern horn of Getares bay, has a tower over it, and is also skirted by rocks ; the bay is sandy, nearly three-quarters of a mile deep, and affords shelter from N.W. and S.W. winds, in 9 or 10 fathoms water, sandy bottom, but it is exposed to N.E. and S.E. winds, which send in a heavy sea ; vessels should therefore leave directly there is any sign of a levanter. Two small streams here run into the sea ; there is a guardhouse and ruined fort at the foot of the slopes.

Verde islet.—A short half mile northward of Rodeo point, and about 4 cables from the shore, is Verde islet. It is about 30 feet high,

barren and rocky, partly occupied by fortifications for the defence of Algeciras road, and surrounded at some distance by rocks. These rocks extend N.N.E. and S.S.W., are partly uncovered, and afford some shelter to small vessels, which anchor north-west of the islet. The passage inside the islet has from 6 to 9 feet water, over rocky bottom, and can only be used by those acquainted with it. Between Carnero point and Verde islet, the shore may be approached to the distance of a short half mile, in from 10 to 16 fathoms water.

ALGECIRAS.*—Half a mile north-westward of Verde islet is the mole of Algeciras projecting from the south-east angle of the town, and from the north point of the entrance to the river Miel, which has a depth of 3 feet at low water, and which at high water and with off-shore winds coasters enter. The town of Algeciras, the Al-Djezirah of the Arabs, stands on a hill which rises gradually from the shore to a height of 220 feet, and contained in 1886 a population of about 12,000. The river Miel on its south, separates it from a small suburb called Villavieja, with which it communicates by means of two bridges. It is an open town, and on its north side, on a steep incline of the sea shore, is the fort of Santiago, which with the fortifications of Verde islet protects the roadstead.

The chief exports are agricultural produce, charcoal and paving stones; and the chief imports, provisions, clothing and general merchandise.

In 1886, 1,216 vessels of all nationalities entered the port, representing an aggregate tonnage of 130,069.

There is frequent communication by steamers to Gibraltar, Cadiz, Ceuta and Mediterranean ports. There are no railways, but telegraphic communication to all parts, and official heliograph with Ceuta.

There is no dock accommodation and no facilities for the repair of vessels, and no supplies for shipping.

The Custom-house and quarantine regulations are the same as those in force at other Spanish ports. No coal can be obtained.

There are no hospitals or homes for sailors.

There are no diseases against which special precautions are necessary.†

* See Admiralty plan of Algeciras roads on sheet No. 1448:—Gibraltar bar.

† From information furnished by H.B.M. Vice Consul, 1887.

Galera rock, lying $1\frac{1}{4}$ cables E. $\frac{1}{4}$ N. from the extremity of the mole is level with the surface of the water, nearly circular, and about 20 yards in diameter. At one cable N.N.E. of the Galera there is another rock, with 10 feet water over it, and in the channel between there are $1\frac{1}{2}$ to $3\frac{1}{2}$ fathoms. Verde islet rock with about $2\frac{1}{2}$ fathoms over it, lies 4 cables northward of Verde islet, with Galera rock bearing West, nearly, and the flagstaff of Verde islet S. by W. $\frac{1}{2}$ W., and in line with the highest peak of the sierra Bullones. There are $5\frac{1}{2}$ and 6 fathoms round it.

Barranco shoal, having a depth of 8 feet, lies north 8 cables from Verde islet, and one third of a mile from the shore.

Beside these dangers, rocks extend along the shore of the town and fort.

On a hill about three-quarters of a mile northward of fort Santiago, is the round, white, and conspicuous tower of Almirante; from the cliffs at the foot of the tower a reef extends off, and 3 cables east of the tower the depth is $3\frac{1}{2}$ fathoms. Inland, W. $\frac{1}{4}$ N., three-quarters of a mile from the tower, and on the slope of another hill, is a square tower, called Pólvaro, 356 feet above the sea, in ruins, and surrounded by a wall. With these towers in line and near the shore, the bottom is rock and gravel, so that vessels should avoid anchoring with those marks on, or in the vicinity.

The anchorage off Algeciras is sheltered from westerly winds, and has good holding ground. Vessels of moderate size will find a good anchorage at 6 cables from the shore in 9 fathoms water, mud bottom, with Verde islet in line with San Garcia tower; fort Santiago bearing West; and the highest belfry of the town W.S.W. It is desirable to anchor northward rather than southward of this position, as the depths are there regular and not greater than 12 fathoms, mud; but vessels should not go north of the parallel of the cemetery (a large white wall extending north and south, on level ground, not far from the shore) which, next to the fort, is the most remarkable building north of it. Large vessels anchor in 16 or 17 fathoms, muddy bottom, about three-quarters of a mile from the shore, with fort Santiago bearing West, and the light tower on Verde islet S.S.W. $\frac{1}{2}$ W. Attention should be paid to keep a clear anchor. Small craft anchor between the islet and the river Miel.

The roadstead of Algeciras is exposed to south-easterly winds, which sends in much sea; vessels should leave when there is any sign of these winds blowing, and proceed either to Mayorga or Gibraltar.

Life-boat.—There is a life-boat and rocket apparatus at Algeciras.

TIDES.—It is high water, full and change, at Algeciras, at 1h. 49m.; springs rise about 4 feet, and neaps $2\frac{1}{2}$ feet; the flood sets to the northward, the ebb to the southward.

Palmones river.—Between Almirante tower and Rinconcillo point, which is half a mile northward of it, the shore is skirted by reefs. From the point the shore is low and sandy, excepting the two points of Mirador and Mala, and continues so round the circuit of the bay to Gibraltar. The river Palmones, the largest of the rivers falling into Gibraltar bay, is $1\frac{1}{4}$ miles north-east of Rinconcillo point, but is so obstructed by sandbanks that boats only can enter. The Guadarranque, a small stream, enters the bay about three-quarters of a mile eastward of the mouth of the Palmones. The tower of Entre Rios is square, and stands on a hill between the mouths of the two rivers.

Anchorage.—Between Rinconcillo and Mirador points there is good anchorage, with winds from N.E. round north to S.W., at about half a mile from the shore, in from 10 to 18 fathoms water, mud bottom; near Mirador point the water is deep. A south-east wind however sends in a sea, hence a vessel should leave for the anchorage of Gibraltar directly an easterly or S.E. wind sets in.

Mayorga.—At about three-quarters of a mile eastward of the mouth of the Guadarranque is Mirador point; the coast between the point and a square tower, a little west of it, is closely skirted by rocks, with 10 fathoms water, at 2 cables from the shore. Between Mirador point and Mala point, $1\frac{1}{4}$ miles farther on, the coast forms a small bay, and near the shore, northward of Mala point, are the villages of Campamento and Mayorga. Mala point is low and surrounded by rocks, a large part of which are dry at low water; they extend off about 2 cables, and are steep-to.

Anchorage.—The anchorage off Mayorga is considered, with easterly and S.E. winds, the best in Gibraltar bay, being free from the squalls over Gibraltar. It is much frequented by Spanish vessels seeking shelter from levanters, whilst strangers anchor at Gibraltar. The water is, however, deep, there being 16 to 18 fathoms sand and muddy bottom 3 cables from the shore, and rapidly deepening outside.

Water and supplies.—Water can be procured from wells near the mouth of the river Palmones, and both at Mayorga and Campamento, water and vegetables can be procured.

Neutral ground.—At Mala point commences the level plain of sandy ground, surrounding the base of the Carbonera hills (elevated 971 feet), and which, continuing southward, forms the isthmus which connects the rock of Gibraltar with the main land. The plain is about $1\frac{1}{4}$ miles long north and south, but the part called the Neutral ground is nearly three-quarters of a mile in length, and about half a mile across. It is low, being in places not more than 2 feet above the level of high water, whilst in other places there are small downs 5 or 6 feet high, the sand accumulated by the sea reaches a higher level on the eastern than on the western side.

All that is to be seen on it are the remains of the Spanish lines of fortifications of 1732, the ruins of the two castles of San Felipe and Santa Barbara forming the terminations. Near the rock are some gardens, the cemetery and racecourse, and on the western shore some temporary houses, and a wooden pier for watering.

GIBRALTAR.—This singular rocky mass, known generally by English seamen as the rock of Gibraltar, is the Mons Calpe of the Phœnicians and Romans, the Gibel Tarik of the Arabs, and the monte de Gibraltar of the Spaniards. It rises abruptly like a wall at the termination of the Neutral ground, to the height of 1,356 feet above the sea, extends $2\frac{1}{4}$ miles south, and is scarcely three-quarters of a mile in breadth. It is formed of compact rock covered with a vegetable soil, and on its north and east sides is precipitous, being accessible only to the monkeys which inhabit its rocky recesses; while on the west it falls in rugged slopes, on which there is some cultivation. It presents to the south several successive short terraces, which descend one under the other, until terminating in Europa point (ancient Leon), which forms the southern extreme of the rock, and east extreme of Gibraltar bay.*

For many years it was the object of various contests between the Moors and Spaniards, until 1462, when it was ceded to the latter. In 1704 it was taken by the British, and with one memorable exception has since continued an undisputed possession. The town stands on the western side of the rock and shelves down to the bay; it contains the governor's house, cathedral, and other churches, exchange, library, and in 1886 the population was 18,440, exclusive of military. The naval and victualling departments are established south of the town, and the New mole, which extends from the shore more than 2 cables in a N.N.W. direction, forms an

* See Admiralty plans :—Gibraltar No. 144, scale, $m = 6\cdot0$ inches : and Gibraltar New Mole, No. 524, scale. $m = 58\cdot5$ inches.

admirable breakwater to an area sufficiently large to afford shelter from south-westerly winds to ships of any draught. The Old mole, originally constructed by the Spaniards in 1618, extends from the north end of the town in a north-western direction, for 1,200 feet; it shelters the mole used by the small trading vessels, the depths admitting those only drawing from 8 to 10 feet of water. There is also a small mole in Rosia bay, near the victualling stores.

The formidable batteries, the vast galleries in the rock (one above the other nearly to its summit), and the strength of the military works, altogether render Gibraltar one of the strongest fortresses in the world. The signal station is on the hill, 1,295 feet high; the highest part of the ridge, 1,396 feet, is over the harbour within the New mole.

Gibraltar is a free port and the trade is considerable, exporting wool, lead, copper, &c., and importing cottons, woollens, hardware, coals, iron, silk, tea, &c. There is frequent steam communication to England and to nearly all parts of the world.

At Her Majesty's dockyard there are about 33 machines of various kinds for the repair of ships; a large smithy and two steam hammers. There is also a 20-tons crane.

In addition to the dockyard there is an establishment, owned by an English firm, at which ordinary repairs to machinery can be executed.

Supplies.—The town is well supplied with meat and vegetables from Spain and Marocco, and there are water-tanks or reservoirs near the victualling establishment in Rosia bay. Shipping are supplied by means of a hose if within the harbour, and from a floating tank if at the anchorage outside.

Coal.—About 4,500 tons of Welsh and North country coal is in store at the Naval Depôt, and about 18,000 tons is also stored in hulks, the property of private companies. The average price is about 20 shillings per ton, and vessels are coaled at the rate of 500 tons a day; but if working day and night, at the rate of 800 tons in the 24 hours.

Telegraph cables.—There are two submarine cables to Lisbon, one to Cadiz, two to Malta, and one to Tangier. The telegraph cables are landed in Camp bay. Telegram to the United Kingdom, 4½d. per word.

Buoy.—A red buoy marks the moorings of the Telegraph ship off Camp bay. It lies midway between the telegraph cables leading to Lisbon and Tangier respectively, and 1½ cables S.S.W. from the north end of Rosia mole.

Money.—Under Order in Council, 2 May, 1881.—100 centimos = 1 peseta = 9½d. English. Gold of 100 pesetas = £3 19s. 4d.; silver of 5 pesetas = 3s. 11½d.; bronze of 10 centimos = 1d. The standard is a gold 25 peseta piece, called Alphonso. English coins at full value.

Anchorage.—In Gibraltar bay many coal hulks are moored; it is necessary to be cautious in approaching these at night. The hulks sometimes drag in the violent squalls, and are also subject to change of position; too much reliance, therefore, must not be placed in their positions as charted. Hulk No. 48, or the southernmost, off Ragged-staff mole, is moored over the wreck of the *Excellent*, marking that spot. Vessels may anchor off the Neutral ground in any convenient place, but it is necessary to have the Devil's tower (which stands at the foot of the rock, and at the north-east end) open of the Rock, to avoid the heavy squalls and eddies during strong easterly winds, and so get the steady breeze over the Neutral ground. This limit is locally known as the "squall-line," and is shown by a dotted line on the chart. With the church of San Roque nearly in line with Mala point, and the Devil's tower a little open, there are from 15 to 18 fathoms water, good holding ground; farther offshore the water suddenly deepens. Small vessels lie nearer the shore, according to their draft.

A space off the Neutral ground is reserved for vessels of war. The squall-line is the southern boundary of the space, and two beacons on the shore, about 4 cables northward of this line, mark the northern boundary.

As south-west winds blow directly into the bay, and send in much sea, vessels during winter on an approaching gale from that quarter should either leave the anchorage for Palmones, or immediately let go a spare anchor, and otherwise make the vessel snug; in consequence of neglecting this timely precaution, the shore of the Neutral ground has often been strewn with wrecks.

The bottom between the Old mole and the Ragged staff is uneven and rocky, and as anchors are liable to drag or break, vessels should not anchor there; besides which, during strong easterly winds, the heavy squalls previously mentioned cause a vessel to swing continually in every direction. There is, however, very fair temporary summer anchorage off Jumpers bastion, in 9 to 13 fathoms water, sandy bottom.

Caution.—No vessel should anchor southward of the line, Rosia mole bearing S.E. (*See Admiralty Chart, No. 144.*)

New mole.—Vessels intending to go alongside the New mole are generally boarded by an officer from the Naval department, who gives the requisite directions for berthing the ship. If it be necessary to proceed at once to the mole without such assistance, the two beacons at the landing place in the naval yard brought in line are the leading marks in. When the red beacon on the breakwater in front of North Jumpers bastion is in line with a white stripe on the wall a little north of the bastion—the marks for the outer berth—the starboard anchor should be let go and the helm put hard to port, bringing the vessel's bows close to the mole, when she may be finally secured with her head out.

Vessels proceeding to the inner berth should let go the starboard anchor when the two white cage beacons on the mole come in line.

These marks for anchoring will not afford sufficient scope of cable for long ships, whose anchors should therefore be let go before either of the two pairs of marks come in line.

Tides.—It is high water, full and change, at Gibraltar New mole, at 1h. 47m.; springs rise 4 feet, and neaps $2\frac{1}{2}$ feet. Strong gales sometimes cause the water to rise considerably above the usual level.*

The stream of the flood sets in round Europa point towards Carnero point, off which it divides, one branch continuing westward, whilst the other trends northward along the western side of the bay; and as the tide sweeps by Europa point, its inner edge branches northward along the eastern side. The water which thus runs into the bay on either side re-unites at its head at about half flood, and causes a stream to the southward down the middle, which re-unites with the general current.

The stream of the ebb sets by Carnero point to the north-east, nearly in the direction of Mala point, and divides into two counter streams near the head of the bay; one stream curves round the bay to the westward, the other to the eastward, and at about half ebb runs out on either side. These streams are occasionally checked by strong winds.

Directions.—A sailing vessel from the westward, with the wind from that quarter, and bound into Gibraltar bay, should give a fair berth to the Pearl rock (page 411) and Carnero point; bearing in mind that the current has a tendency towards the latter, and squalls come down from the high land over it. With an easterly wind and

* During an easterly gale on November 3rd, 1863, the sea rose as far as the houses in Catalan bay, on the east side of Gibraltar.

a heavy sea Carnero point should be carefully avoided, and the southern board continued until the vessel can reach the middle of the bay on the starboard tack; then keep in the steady wind westward of the strong squalls and eddies, which blow down over the rock, and work up to a convenient anchorage.

If from the eastward with westerly winds, a vessel should work round Europa point with the flood tide, standing but little off, and towards the point to a prudent distance, and it will be passed in two or three boards. But with an easterly wind, after having rounded the point, keep up the middle of the bay in the steady breeze beyond the reach of the squalls the demarcation of which will be seen. The edge of the bank off the Neutral ground is steep-to; at night, the *red* light at the New mole will assist a vessel in anchoring.

Should the wind be fresh from the eastward and southward of East, the squalls on the west side of the rock will be from the southward, when a vessel bound for the New mole may steer for it before the squalls. If, however, the wind be northward of East, the squalls will be from the northward, a vessel should then work up in the steady breeze until near the anchorage at the Neutral ground, and then run down for the mole before the squalls, under easy sail.

The eddy winds from the rock on its east side, caused by westerly winds, are as dangerous as those on its west side produced by easterly winds, and vessels should never go within the line of the steady breeze when approaching it to round Europa point.

COAST OF AFRICA.—CAPE SPARTEL TO CEUTA BAY.

CAPE SPARTEL* (Raz-el-Skukkar), the north-west extremity of Africa, and the south-western limit of the strait of Gibraltar, terminates in a mass of black conical-shaped rock, which, seen from a distance of 15 or 18 miles to the north and south, appears detached like an islet. It is commanded by high land which attains an elevation of 1,068 feet above the sea, being part of a chain running east and west; south of the cape the land falls rapidly, forming an extensive plain, in the middle of which is situated mount Nipple, remarkable by its isolation and conical form. The cape is skirted by a reef which extends from it about 2 cables, and foul ground also extends to the south-westward. With the lighthouse between the bearings

* See Admiralty charts:—Strait of Gibraltar, No. 142, scale, $m = 0.7$ inches; Africa, west coast, Strait of Gibraltar to river Gambia, No. 1,226, scale $d = 1.4$ inches; and Africa, west coast, sheet, I., cape Spartel to Azamur, No. 1,227, scale, $m = 0.13$ inch.

Chapter VII. of this volume, being in part identical with chapter II. of African pilot, part I., and chapter II. of Mediterranean pilot, vol. I., the mariner should consider which book contains the later information.

of East and E.S.E., the shore should not be approached within three-quarters of a mile. The high land over cape Spartel is conspicuous when bearing S.E., as there are two remarkable grey patches of vertical rock about a third of its height from the summit.

Spartel bay.—Half a mile south of cape Spartel is situated a sandy bay, where small vessels find shelter from easterly winds, in 6 or 7 fathoms water, at half a mile from the beach; heavy squalls, however, blow off shore, and a continual swell makes it difficult to land. The elevation of the mountains decreases rapidly abreast of the bay. See caution against landing, page 450.

Race.—It is necessary to guard against the violent currents which sweep round cape Spartel, and the tide races which they sometimes produce.

LIGHT.—Half a mile eastward of the west extreme of cape Spartel is situated a square white stone tower 79 feet high, from which is exhibited, at 312 feet above the sea, a *fixed* white light, which should be seen in clear weather from a distance of 20 miles; from it the lighthouse on cape Trafalgar bears N. $\frac{1}{2}$ E., distant 24 miles.

Soundings.—The 100-fathoms line lies about 3 miles westward of cape Spartel, but immediately southward of the cape the bank within that depth increases its breadth to about 20 miles, and the 100-fathoms line continues nearly parallel to the shore for a considerable distance.

Coast.—North of cape Spartel the coast is high and composed of uninterrupted steep cliffs, at the base of which a little beyond the cape, are some black pinnacle rocks above water named the Needles. About $1\frac{1}{4}$ miles north-east of the cape is situated Fraylequito point, at the termination of which is a small black islet surrounded by rocks. The coast thence turns eastward for 3 miles, and is high and irregular, but not so cliffy, to Judios point; the most projecting part between being Pigeon point, remarkable and well defined when seen from east or west. Judios point is more salient and remarkable than either of the other points, and is known from seaward, rather by the white cliffs that form it than the point itself, which is only well defined when bearing east or west. The coast between cape Spartel and a point situated one mile east of Pigeon point is steep-to.

Judios bay.—At nearly three-quarters of a mile eastward of Judios point is situated Judios bay, which has a small sandy beach at its head, the only one on this portion of the coast. A small stream of the same name as the bay discharges through it, and runs down a

narrow valley which separates the mountain of cape Spartel from the Mesa de Marchan (table-land of Marchan) which is contiguous to Tangier. These two heights form good points for distinguishing the coast from seaward, and are sufficiently remarkable to be recognisable even at night, should the weather be clear. The valley through which Judios rivulet flows, presents a remarkable break, which completely separates the mountain of cape Spartel, that is uneven and irregular, from Mesa de Marchan, which is level and not so high, being only 342 feet above the sea.

On the eastern point of the bay are situated the ruins of a fort and a marabout tower stands on the slope of the western portion of Mesa de Marchan.

TANGIER BAY.*—A white and reddish cliff commences at Judios bay, and terminates at Tangier point, distant one mile to the eastward; when seen from a distance it appears like a patch in the middle of the coast. The shore is here skirted by reefs, and Tangier point terminates in low rocks. The town of Tangier stands near the sea, and on the eastern slope of the table-land of Marchan; the most remarkable objects from their height being the castle (la Casbah), and a mosque at the north-west angle of the town; the north-east angle being at Tangier point. The houses standing above each other and being entirely white are seen from some distance, but when approaching from the westward, the table-land of Marchan prevents the town from being seen until abreast of it. The population of Tangier in 1886 was estimated to be 20,000.

The bay is 3 miles wide and one deep, Tangier point forming its western extremity, and Malabata point its eastern; the latter bears from the former point E. by N. $\frac{1}{4}$ N. The bay from the offing appears much deeper than it is, from being surrounded by high land; nearly all its western shore is a clean sandy beach, with from 5 to $6\frac{1}{2}$ fathoms water at 3 cables distant, but eastward of fort Arabi-el-Said ($2\frac{1}{2}$ miles east of the town) rocks and foul ground extend $1\frac{1}{2}$ cables from the foot of the cliffs at the coast line.

Tangier point is foul on its northern side for a distance of 2 cables, and eastward and southward of it, for a distance of three-quarters of a mile, the 3-fathoms line is found at a distance of 3 to 4 cables from the shore.

There is an isolated conical hill about two-thirds of a mile inland over the head of the bay, named mount Direction, which serves as a mark for the anchorage; and a little east of it is situated another

* See Admiralty plan, Tangier bay, No. 1,912; scale, $m = 3\cdot5$ inches.

hill not so high, on which there is a whitish tower. Between these two hills winds a small stream, which falls into the sea near the ruins of old Tangier; it is crossed by two bridges, one of which is white, and that nearest sea in ruins.

Another rivulet joins the above, immediately east of old Tangier. There are two batteries on the eastern side of Tangier bay; one (Arabi-el-Said) at the termination of the sandy shore, close to which there is a tower in ruins, and another half a mile farther to the north-east.

From the foot of the battery at Tangier point, rocks which cover at high water extend, and upon them are the remains of an old mole, extending 2 cables eastward, and affording shelter for small craft from northerly and north-west winds. About $1\frac{1}{2}$ cables farther southward is situated another reef consisting of a group of rocks, one of which is 12 feet high. Between the two reefs is a curved beach, off which the water is shallow, but where small vessels load and discharge cargo; the custom-house is situated on the beach, and this is the only place where landing is permitted. Easterly and south-east winds send in a sea, when the beach cannot be approached without considerable risk.

Tangier.—The town of Tangier (Tanjah of the Arabs, and Tingis of the Romans) is enclosed by walls, and may contain a population of 10,000. It is the residence of the Consuls-general and Consuls of the principal nations, and a few European merchants reside here. It is coming into favour as a winter resort. The gates of the town are locked at sunset.

Communication.—There is steam communication between all Moorish ports and London twice a month, and with Marseilles twice a month. Between Tangiers and Gibraltar almost daily, and with Algeria and Cadiz weekly. The Eastern Telegraph unites Tangiers with Gibraltar and England.

Supplies.—Fresh provisions in small quantities can be obtained at Tangier, but water is scarce.

LIGHT.—From the battery at S.E. corner of sea wall at Tangier is exhibited, at an elevation of 58 feet above high water, a *fixed* light, *red* from S. 17° W. to S. 72° W. and *white* from S. 72° W. over Tangier road; the *red* light is visible in clear weather from a distance of 5 miles.

The lighthouse is circular and painted white. A black vertical line 4 feet wide on the wall of the town, in line with the lighthouse indicates the dividing line between the two colours of the light.

Trade.—In 1886, 764 vessels of all nationalities entered, having an aggregate tonnage of 186,693 tons. The number of Spanish vessels is increasing. The total value of exports and imports amounted to £664,187. The importation of tobacco, opium, arms and ammunition is prohibited.

Bourée rock lies about half a mile from the south shore of the bay. It is about $1\frac{1}{2}$ cables in circuit, and the least water on it is 3 feet, but the sea seldom breaks on it. From its shoalest part, mount Direction bears S.W. $\frac{1}{2}$ S.; White tower (marabout) east of mount Direction) S. by W. $\frac{3}{4}$ W., and fort Arabi-el-Said E. $\frac{1}{4}$ S. There is a depth of 2 fathoms for a distance of about three-quarters of a cable west and south-east of the rock, from 4 to 7 fathoms water between it and the shore, and about the same depths at half a cable north of it.

Anchorage.—Tangier bay is the only anchorage of any importance on the south coast of the strait of Gibraltar, and where vessels of any size may anchor. Although exposed to winds from N.W. round by north to N.E., it affords security with those from other points of the compass. North-west winds send in much sea, that is felt even with the wind as far round as south-west; those between north and north-east do not last long nor send in much sea. A vessel may anchor anywhere in the middle of the bay in about $7\frac{1}{2}$ fathoms water, sand and good holding ground, with mount Direction bearing about S.S.W. A large vessel should keep Judios point open of the fort in ruins on the east point of Judios bay, and also Europa point open of Malabata point. Small vessels anchor nearer the shore. During the winter months vessels should be prepared to leave quickly.

A vessel entering Tangier bay during an easterly gale, will find convenient anchorage off a small beach about a mile southward of Malabata point, in 8 or 10 fathoms water, where there is better shelter than further westward, and it is a fair position from which to continue the voyage when the wind slackens or changes. The 3-fathoms line in this eastern portion of Tangier bay lies at a general distance of about 2 cables from the shore, but at $1\frac{1}{10}$ miles south of Malabata point $2\frac{3}{4}$ fathoms is found at nearly 3 cables from the coast; east and west of which and more in the centre of the bay are two shoals with $4\frac{3}{4}$ fathoms water on them. When working out of the bay and standing towards old Tangier, keep Europa point open north of Malabata point to avoid the Bourée rock.

Tides.—It is high water, full and change, at Tangier point at 1h. 42m.; springs rise $8\frac{1}{2}$ feet, neaps 5 feet.

The flood stream in the offing north of Tangier bay runs from east to west, and the ebb in the reverse direction, turning in mid-channel at high and low water by the shore. Three hours after it is slack water in the offing or at about half ebb by the shore at Tangier, the ebb stream within the bay runs from east to west or in a direction contrary to the offing stream. Northward of Judios point, the tidal stream is strong, causing eddies both on the flood and ebb resembling breakers, however little sea there may be; this occurs more especially during springs.

Malabata point, at the eastern extremity of Tangier bay, is a bold, prominent headland, terminating in cliffs and bordered by rocks, which extend $2\frac{1}{4}$ cables from it in a south-westerly direction, it has on it a battery and a circular white tower, the land rising from the point to a height of 792 feet.

Almirante rock.—A rocky shoal with $3\frac{1}{2}$ to $4\frac{1}{4}$ fathoms water on it, lies N. $\frac{1}{2}$ W. from the tower on Malabata point, distant 7 cables. There is generally a swell over it, and with strong winds from the westward the shoal breaks. Between Almirante rock and the shore there are from 8 to 12 fathoms; no large vessel should, however, use this channel except in cases of necessity, but pass Malabata point at a distance of a mile in 12 to 15 fathoms water.

The coast from Malabata point trends nearly East for $3\frac{1}{4}$ miles to Al Boassa point, and between is point Altares, recognized by the cliff of a triangular form which terminates it; the shore is all along high, steep, rocky and commanded by high land. At about a mile from the former point lie the Peril rocks, a group of dark rocks, most of which are above water, and about a cable north of them there is a sunken rock on which the sea occasionally breaks. Between Altares and Al Boassa points there is a slight indentation with several small white sandy beaches separated by rocky points; of these latter the most remarkable is Kankush point, which separates the two largest beaches, one known as Cala Baja, and the other as Hermosa.

The shore is here bordered by a bank with several rocky heads, and the Caña Coja reef in the middle of the bay dries at low water, and is separated from Kankush point by a channel nearly a cable wide with 6 and 7 feet water. The fishermen of the strait, and at times coasting vessels, seek shelter from strong easterly winds by anchoring near the shore off these beaches. A rivulet falls into the sea, a little east of Kankush point.

JASEUR BANK.—At a third of a mile to the N.N.E. of the Caña Coja reef, and about N.W. $\frac{1}{2}$ N., distant nearly three-quarters of

a mile from Al Boassa point, lies Jaseur rock with 13 feet water on it. There are other rocky heads inside it with deep water between, and the bank northward of it between Al Boassa and Altares points, extends $1\frac{1}{2}$ miles from the shore, with from 6 to 9 fathoms on it.

Phoenix bank lies $1\frac{1}{2}$ miles N. by E. from Altares point, with 8 fathoms on it, and half a mile south-west of it is another bank with 9 fathoms; 2 miles north of these the depths are over 100 fathoms.

In the vicinity of Jaseur and Phoenix banks, the tide is nearly always running strong either east or west. To clear the Jaseur rock keep mount San Simonito open eastward of Al Boassa point, until the town of Tangier is its apparent length open of Malabata point.

AL BOASSA POINT is the termination of high land, which at about 2 miles southward of it attains the height of 905 feet, descending rapidly to the sea. It only appears salient when seen from east or west, presenting then a bold headland. It is rocky, and at 2 cables N.N.E. of it is a rock with three feet water over it. At about $1\frac{1}{4}$ miles south-eastward of Al Boassa point is Cala Grande, a bay with a sandy beach more than half a mile in length. Small vessels passing the strait from east to west may anchor here to await the turn of tide, in 9 or 10 fathoms water, sandy bottom, at half a mile from the shore. The bay affords no shelter, except with the wind off shore.

The river Ostras runs into the sea at the east end of the beach after descending through an extensive valley; small but excellent oysters are found in the river, from which it takes its name. In the interior, mount San Simonito, 803 feet high, terminates in two peaks, the western being the most pointed.

ALCAZAR POINT.—From Cala Grande the coast backed by high mountainous land extends eastward for $4\frac{1}{2}$ miles to Alcazar point; it is composed of sandy beaches interrupted by rocky points, and at the distance of half a mile there are from 10 to 15 fathoms water, generally rocky bottom with patches of sand. Alcazar point projects northward and is fringed with rocks. A river falls into the sea on the east side of the point, and at its mouth are the ruins of a town; eastward of it is a small beach.

The beach before mentioned forms a bay on the east side of the point, where there are 5 or 6 fathoms water, and were it not for the hostility of the Moors, it would be a most convenient place for small vessels to seek shelter from westerly winds.

CIRES POINT.—From the above bay the coast, which is chiefly of cliffs with sandy beaches interrupted by rocks, trends to the N.E.

for $3\frac{1}{2}$ miles to Sainar point, which is low and projects but little. At a third of a mile from the shore there are from 9 to 12 fathoms water. At $1\frac{1}{2}$ miles farther on is Cires point, with two rocks or islets off it, the rocky channel between being nearly 2 cables wide; the coast between the two points forms R'Mel bay, in the southern part of which is a fine sandy beach. From Cires point the land suddenly rises 740 feet high, and forms a remarkable hill extending north and south, known as mount Cires, which when seen from certain positions bears some resemblance to Gibraltar.

At the foot of the mount, on the south-west, is the sandy beach before alluded to, and at its south end the river R'Mel falls into the sea after winding through a deep valley. At about $3\frac{1}{2}$ miles south from Cires point is the rounded summit of a mountain 1,561 feet above the sea, visible from nearly every part of the strait.

LANCHONES POINT, a mile eastward of Cires point is high and bluff, with a rocky base, the land a mile within it rising 1,161 feet. Cires bay between the two points is about half a mile deep, with a sandy beach and deep water off it. The coast between Lanchones and Cruces points forms a bold front for three-quarters of a mile; it is shallow close in, but at the distance of half a mile there are 100 fathoms; the current here is very strong.

Almanza bay, between Cruces and Almanza points, is about half a mile wide, 4 cables deep, with a small sandy beach. In the middle of the bay there are 3 and $4\frac{1}{2}$ fathoms water, sandy bottom, offering convenient anchorage for small craft, and is one of the best on this part of the coast. A small stream flows into the bay, and in the interior there is a long narrow valley, in the middle of which is a remarkable conical height with its rocky summit crowned with verdure. Almanza point is clear of danger, bold and remarkable, has a level summit, and rises from the sea like a wall.

Peregil island.—From Almanza point a high rugged coast continues eastward as far as Peregil or Coral island, and then turns north-east to Leona point. The centre of this island is exactly midway between each point, or a short mile from both. It lies at the base of the sierra Bullones or Apes hill, with the land of which it appears blended. It is of nearly triangular form, a mile in circuit, and its northern part 243 feet high. It is entirely rock, and steep, but covered with brushwood, presenting to the northward, cliffs of the same colour as the rugged height of Bullones, from which it is separated by a channel $1\frac{1}{2}$ cables across, full of rocks, forming a natural breakwater, with passages for boats between them. Sea birds

build largely on the island, and their eggs are to be found in great numbers.

The western side of the island is bold, there being from 11 to 22 fathoms close to it. On its eastern side there are two coves; the northernmost called Rey or Levante, and the southernmost Reina; they are only fit for small craft. There are other coves on the north and west, where landing, which is somewhat difficult, may be effected to climb the cliffs, should it be necessary to reach its summit for any purpose, or to obtain fuel. It contains a cave called Palomas, in which 200 men could find shelter, and there are the remains of a tower at the entrance to Reina cove, and a cistern commenced, a work probably of the Portuguese, and of the time of the conquest of Ceuta.

Peregil rock.—A reef extends a short distance from the north-east extremity of the island; and a rock which scarcely uncovers at low water springs, lies rather more than a cable about N.E. by E. of it, with 5 fathoms between it and the island. Another rock with $3\frac{1}{2}$ fathoms water on it lies E. by N. nearly, of the former, 2 cables from the north-east point of the island, there being between the two a depth of 22 fathoms.

Anchorage.—Between Peregil island, and the coast, there is good shelter and swinging room for small vessels, both from easterly and westerly winds, in 6 to 8 fathoms; the entrance is rather narrow but there is deep water close up to Leona point. With strong winds a heavy swell sets against the rocks at the entrance. The island would be resorted to but for the unfriendliness of the Moors. Smuggling craft and fishing vessels, when overtaken by bad weather, are all that frequent it. In case of necessity a vessel may obtain water on the shore of the mainland opposite the island; but the greatest precaution must be used against any sudden attack. Fuel may also be had from the shrubs which abound on the island.

LEONA POINT.—The north extreme of the south coast of the strait projects northward from the high range of the Bullones; it is high and level, terminates in cliffs, and can be seen from a great distance. The point is very bold, there being 200 fathoms but a short distance off.

Sierra Bullones (Apes hill).—This celebrated mountain named by the Moors Jibel Mousa, and by the ancient Romans Abila, is very remarkable, and with the Rock of Gibraltar well marks the eastern entrance to the strait. The Bullones, rugged in outline is precipitous, ascending in a series of sharp inaccessible cliffs to its

summit and peaks—which are nearly of the same elevation—the highest 2,808 feet above the sea, commanding the whole chain of mountains on this part of the coast.

This mountain, and Gibraltar under the name of Mons Calpe, were called by the ancients the Pillars of Hercules; and in very early ages were considered by the people dwelling east of them, as the western boundary of the world.

BENZUS BAY.—At $1\frac{1}{2}$ miles eastward of Leona point is Blanca point, high, steep, and of a dark reddish colour, with the ruins of a tower on it. The coast between the points forms a bay more than half a mile deep bounded on the west by high inaccessible cliffs, which terminate in Leona point, and on the east by high land. The land at the head of the bay rises rapidly in terraces one above the other, on some of which are the remains of towers and buildings.

There is abundance of excellent fresh water falling in the caves on the beach under the cliffs.*

Anchorage.—In case of necessity, with winds southward of east or west, small vessels will find anchorage here in 5 fathoms, the water shoaling gradually.

Benzus rock.—To the north-west of Blanca tower, and 4 cables from the shore, there is a rocky shoal with $2\frac{1}{2}$ fathoms water on it, and 7 to 10 fathoms round it. Between it and the shore the space is encumbered with rocks, which extend from the east point of Benzus bay.

To clear the shoal keep the whole of the walls of old Ceuta open of Bermeja point.

Susan rock, having a depth of 15 feet, lies E. by S. $\frac{1}{4}$ S., 3 cables from Benzus shoal, is about 20 yards in extent and has 6 to 9 fathoms water close round it. From the rock, Leona point bears W. by N. $\frac{1}{2}$ N. $1\frac{1}{2}$ miles, Blanca point tower (ruin) S. by W. $\frac{1}{2}$ W., 3 cables, and the north angle of old Ceuta wall is seen just open of Bermeja point.

Melita rock.—A rock on which the British steamer *Melita* struck and was wrecked in the year 1886 is reported to be situated about a quarter of a mile from Blanca point. This rock is of small extent, has a depth of 12 feet, and lies with Blanca point, bearing S. 73° W., and Calamocarra islet, S. 24° E., distant $2\frac{1}{2}$ cables.

Marabut mountain.—About a mile south-east of Blanca point is Bermeja point, on which are the ruins of a tower; it derives its name from the reddish colour of the land. The coast between is the

* H.M.S. *Grappler* anchored here in June 1888, in 8 fathoms water, sand, with Leona point bearing N. 19° W.; lower square tower S. 15° W., and Benzus point East.

base of the Marabut mountain, which has several breaks or fissures, more or less deep, covered with vegetation to the shore. A white marabut tower stands on its summit 1,110 feet above the sea; upon the hill to the southward are several Spanish redoubts, and on the eastern slope towards the boundary are other batteries, a mosque, &c.

CEUTA BAY, with from 15 to 20 fathoms water at the entrance, shoaling to 5 fathoms within 2 cables of the shore, is formed between Bermeja point and Santa Catalina point, nearly 3 miles eastward. It is a mile deep, but affords no shelter for large vessels except from S.W. winds, as fresh S.E. winds cause much sea, and those from the westward send down heavy squalls over the mountains. Hence no vessel should seek shelter in this bay, and much less with easterly or westerly winds with any northing in them. At $1\frac{1}{2}$ miles from Bermeja point, is the low point of Benitez with reefs extending from it; between the two points the coast forms a bend with sandy beaches, interspersed with rocks at a short distance from the shore.*

The Campo are two large rocks above water about 2 cables north-east of Benitez point, and having $1\frac{1}{2}$ and 2 fathoms water between them and the shore; they are surrounded by sunken reefs, some of which uncover at low water to the distance of nearly three-quarters of a cable, on which the sea nearly always breaks; shallow water also extends nearly half a mile from the shore. On the most northerly of the Campo islets is placed a perch 8 feet high, and surmounted by a disc painted black and white vertically.

The eastern slope of the Marabut mountain descends in the proportion as it extends eastward, and continues narrowing until it becomes a mere tongue of low land a little more than a cable across, forming the isthmus of Ceuta, at the commencement of which are the fortifications that protect the port from the land side. The ruins of the old town of Ceuta are at the foot of the hill, about half a mile west of the fortifications, separated from the modern town by a channel or canal joining Ceuta bay and Madraga bay on the south. The modern town, or rather that of the barrio Almina, occupies the northern and western slope of the peninsula of Ceuta, in the form of an amphitheatre, the peninsula being a series of seven small hills, which ascend gradually eastward to the largest and highest, monte del Acho, on the summit of which is the castle of the same name, 640 feet above the sea.

* See Admiralty plan of Ceuta, No. 2742; scale, $m = 4.7$ inches.

The land east of the town of Ceuta is called the Almina, and embraces an extent of nearly 2 miles east and west, and nearly 5 miles in circuit, with a rocky coast. It includes the seven small hills above mentioned, the new town or barrio of Almina, the castle Acho on the mount of that name, a modern building erected on the ruins of the old one attributed to the Romans, and various forts. This mount is remarkable from its isolated position and the strong castle which crowns it, the walls and buildings of which are seen from a great distance. The town of Ceuta proper (the Sebtah of the Arabs, and the Septa of the Romans) stands on the lowest and narrowest part of the isthmus, constituting, with the batteries and outworks, the third part of this military post.

To the westward of the fortifications the land gradually ascends, and on a small hill is the watch tower of the Spanish sentinel. A little farther on is a walled district in ruins, the remains of the ancient town (Ceuta la Vieja), and beyond it is the line of separation between the Moorish and Spanish territories. The modern city, or barrio Almina, is the most handsome part, the houses being seen among the shrubs and trees of the gardens which surround them, at a distance presenting an agreeable and pleasing prospect.

As a fortress Ceuta is strong and well supplied with the munitions of war. It is the principal presidency of the Spanish possessions on the African coast, and destined to figure in the commercial world if it should, as intended, be ever declared a free port, but at present there are no supplies of any kind. This important fortress, one of the keys of the strait, was gained by Don Juan I. of Portugal, who took it from the Mahometan power in 1415, but since the revolution of 1640, when the Portuguese detached themselves from Castile, it has remained in the hands of the Spaniards, who have been increasing their fortifications, and converting it into another Gibraltar. The population in 1830, including the military, was 23,000.

Anchorage.*—The best anchorage in Ceuta bay is N.W. of the middle of the new town in 8 to 13 fathoms, sand and rock. It should be observed that Obispo street should be kept open; this is the principal thoroughfare, and begins on the side north of the Governor's house, which is the most conspicuous at the commencement of the Almina; the belfry of the church of San Francisco at the higher end of the street may assist in recognising it. A vessel at this anchorage should be prepared to leave should it come on to blow hard from east or west. The mail vessels which run between this and Algeciras make fast to buoys.

* The tunny fishing nets are laid in the southern part of the roadstead.

At the western end of the town near the Government house is a mole, to which small craft such as feluccas may be secured, and about 2 cables off the mole, small vessels anchor in 6 and 7 fathoms water.

Artificial harbour.—Two breakwaters are in course of construction in Ceuta bay. The northern, starting from Las Heras tower, will extend 616 yards in a W.N.W. direction, or in a direct line towards the most northerly of the Campo rocks; and continuing in a curve towards the south-west will, when completed, have a total length of 1,270 yards. The southern breakwater, starting from a spot about 100 yards westward of Government house, extends in a N.E. direction, and will have a length of 440 yards. The area to be enclosed will have a depth of 8 to 3 fathoms within a cable of the shore.*

A *green* light is shown from the end of the north mole in course of construction; it will be moved outwards as the works progress. Also a small *green* light from the south mole end, and a *red* light from the battery to the eastward, to guide to the small dry dock.

Tides.—It is high water, full and change, at Ceuta, at 2h. 5m.; springs rise $3\frac{1}{4}$ feet, and neaps $2\frac{1}{2}$ feet. The flood sets west and the ebb east.

Santa Catalina point, the eastern extreme of the bay of Ceuta, is low, projects northward, is surrounded by rocks and reefs, and a fort of the same name commands it.† The rocks off the point are high, and extend about $1\frac{1}{2}$ cables to the northward; and a rocky bank with $3\frac{1}{4}$ fathoms water on it, known as Isabel bank, extends about a quarter of a mile northward of the rocks, and in heavy seas the current sets very strong over it. At the distance of 4 cables from Santa Catalina point, the depth varies from 11 to 23 fathoms, rocky bottom, and there are above 100 fathoms at three-quarters of a mile eastward of the peninsula. This point bears S. $\frac{1}{2}$ W. distant about $12\frac{1}{2}$ miles from Europa point.

Almina point, the eastern extreme of the Almida de Ceuta, is low, being the termination of mount Acho. It is commanded by a battery, and a little to the south of it, on the summit of the hill called Mosqueros, stands the light tower. From Almina point the coast trends southward, and soon after S.W. and West, forming the peninsula of Ceuta, and with the coast of Africa the great southern bay of

* "Both breakwaters are in abeyance. The northern is about 50 yards in length, the construction so far being poor and mean, and very much broken by the heavy sea."—Captain H. C. St. John, R.N., 1888.

† See Caution, page 409.

Ceuta, in which vessels find good shelter from winds between S.W. and North.

LIGHT.—The lighthouse on Mosqueros hill exhibits at an elevation of 590 feet above high water, a *revolving white* light, which attains its greatest brilliancy *every minute*, and should be seen in clear weather from a distance of 23 miles. This light, in conjunction with that on Europa point, shows by night the eastern entrance to the strait of Gibraltar.

Life-saving apparatus.—There is a life-saving apparatus at Ceuta.

Soundings, westward of the strait of Gibraltar.—

Between Cadiz and Cape Trafalgar, at 20 miles from the shore a depth of 100 fathoms is obtained; the bottom is mud and sand on the parallel of Cadiz; sand and shell between that place and Trafalgar; and coarse sand and gravel mixed with rocky substances as Trafalgar is approached. Northward of Trafalgar, from the line of 100 fathoms to within 7 miles of the land, the soundings decrease gradually to 25 fathoms; to the south-west of the cape, towards the Phayre and Aceitera banks, the depths shoal more rapidly. Between cape Trafalgar and the Cabezos shoals the water is deeper, there being 30 fathoms within $2\frac{1}{2}$ miles of the shore; the bottom here is similar to that obtained anywhere along the northern shore of the strait, viz., coarse gravel mixed with broken shell and pieces of rock.

On the African coast south of cape Spartel, at 20 miles from the shore the water shoals gradually from 100 fathoms (mud), but this bank of soundings narrows as Spartel is approached and rounds the cape at $2\frac{1}{2}$ miles, the bottom changing to coarse sand and shell. Eastward of cape Spartel the bank of soundings extends to an average distance of 3 miles from the shore, as far as Cires point, whence to point Almina it does not extend further than one mile from the shore, excepting in the bay of Ceuta.

The deep-water channel (between the lines of 100 fathoms) on a line with capes Trafalgar and Spartel is $9\frac{1}{2}$ miles in breadth; the bottom being very irregular and having a general slope on both sides of a ridge, the deepest water on which, apparently, does not exceed 150 fathoms.

On the above-mentioned ridge which separates the waters of the Atlantic from the Mediterranean, and at about two-thirds the distance across from cape Trafalgar, is a bank of coral, sand, and weed, on which is a depth of 45 fathoms, with 100 fathoms round it at $1\frac{1}{2}$ miles.

From the meridian of Spartel the width of the deep-water channel

gradually decreases to $5\frac{1}{2}$ miles on that of Tangier, continuing that breadth until near the meridian of Carnero point, where it gradually widens. The bottom in the deep-water channel is rock, gravel, and broken shell.

DIRECTIONS.*—The Strait of Gibraltar (West to East).—Vessels bound to the Mediterranean from the westward usually make cape St. Vincent; steam vessels then steer direct for the centre of the strait; a sailing vessel, however, with winds from West round by south to E. had better make cape Spartel; with winds from N.W. round by north to east she may make cape Trafalgar. If making cape Trafalgar in thick weather the safety of the ship may be assured by the use of the lead and chart, as the soundings extend some distance from the land; the shoals off the cape and the Cabezos should be carefully avoided. In clear weather, and with ordinary care, there is no difficulty, none of these dangers extending beyond $\frac{1}{2}$ miles from the land; in thick weather, however, caution is necessary, the currents and eddies between cape St. Vincent and Tarifa being very variable. Cape Spartel is safe of approach, being clear of danger and having 100 fathoms water at 3 miles from the shore; the land above the cape being about 1,000 feet in height, can be seen from a considerable distance. A light is exhibited from cape Trafalgar; also from cape Spartel, and as they are about 24 miles apart (north and south, and either light in clear weather is seen at the distance of about 20 miles in all directions seaward), the extreme range of these lights embraces more than 60 miles of latitude, and thus, on approaching the strait of Gibraltar, unless in very thick weather, one or other of these lights is seen.

With a fair wind through the strait, keep in mid-channel, so that the vessel will be clear of risk and will have the advantage of the easterly current; for the same reason a sailing vessel with an easterly wind should work in mid-channel whilst the flood tide is making, but on the ebb (which sets to the eastward) she may approach either shore, with a chance of meeting with favourable slants of wind; if it be blowing fresh, a vessel will (especially if she be able to gain the meridian of cape Plata or Malabata point) get through the strait, provided she keep in mid-channel and can carry at least her topsails (even close reefs). When Tarifa is passed, the force of the wind will have lessened and an attempt should then be made to reach Gibraltar or to enter the Mediterranean. If the easterly wind

* See Admiralty chart, cape St. Vincent to strait of Gibraltar, No. 32; scale, $m = 0.2$ inches.

is so strong as to prevent a vessel carrying sail, shelter should be taken under cape Spartel, keeping under easy sail to await more favourable circumstances. Coasting vessels which keep the Spanish shore on board reach Tarifa easily, availing themselves of the set of the tide, and anchoring off Los Lances (*see* page 408), if the wind be too strong to admit of their keeping under sail. When the easterly wind inclines to the northward, it is advisable to keep on the Spanish coast, remembering Pearl rock (*see* page 411), but when to the southward, the African coast is preferable.*

Working through the Strait from East to West.—The passage through the strait of Gibraltar from east to west against the general easterly current from the Atlantic is, even with a fair wind, (especially during neap tides) somewhat difficult for sailing vessels, but with westerly winds which increase the strength of the current, it is, for a large ship, almost impossible. Some instances are known of vessels of war having achieved it, but these cases, favoured by circumstances, are rare. From Europa point, vessels should continue to work along the coast of Spain during the flood tide until reaching Tarifa where, if necessary, they should anchor to await the next flood tide. If from Algeciras, they should get under weigh at half ebb and so reach point Acebuche, by the commencement of the flood. If a vessel cannot reach Tangier by following these directions she should cross to the African coast (not before half flood) and work up on the African coast with the favouring tide, anchoring when necessary until Tangier bay is reached. Unless strong S.W. winds render it necessary, however, the Spanish coast should not be abandoned for the African, the flood stream being felt at a greater distance from the former than from the latter; in any case Tarifa should be fetched before standing across, otherwise there will be no certainty of weathering point Cires, and should a vessel fall to leeward of it, it will be difficult even to regain Gibraltar bay.

Having weathered point Cires, work within the counter current and near the shore to take advantage of any slant of wind that may occur, and then doubling Malabata point, gain Tangier bay whence, with a single flood, it will be easy to regain the Spanish coast. When once the meridian of Tangier is passed, there is less current and a more manageable wind than in the narrows.

If a vessel succeed in doubling Tarifa by keeping the Spanish coast, she should continue working up the bay of Lances, while the tide

* *See* remarks on page 439, on the most favourable months for navigating the strait.

remains favourable, when, gaining Peña tower she should (if it be preferred not to work inshore of the Cabezos) cross to the African coast and work up under that as above directed. If the wind be S.W. with moderate weather the Spanish coast should be kept, as by crossing to the African shore, where the wind will probably be found lighter, a vessel will be set to leeward. Should the wind shift to W.N.W. or N.W. the Spanish coast should still be kept. (To avoid the Cabezos shoal (*see* page 407).

The greatest difficulty is in gaining the meridian of Tangier (more especially during neap tides), after passing which the strength of the easterly current and the force of the wind diminishes, and a more rapid progress can be made.

Vessels beating through the strait to the westward should get under weigh or sail from shelter at low water, keeping inshore ; at half flood long tacks may be made from shore to shore, regaining shelter or anchoring before high water.

From the eastward with a fair wind (whether in sailing or steam vessel) careful attention should be given to the set of the tides making either one coast or the other (that of Spain being preferable), and following it with the object of keeping as much as possible out of the influence of the easterly current. Unless the wind be sufficiently strong to keep good way on the ship, do not approach too near the projecting points, such as Carnero, Acebuche, Tarifa, Cires, &c. If the wind be light it would be prudent to anchor.

WINDS AND WEATHER.

STRAIT OF GIBRALTAR.

In the Approach.—On the coast between Cadiz and cape Trafalgar the easterly winds are squally and dry, with a clear sky overhead. Small streaky clouds (*cirrus*) are occasionally seen ; and when they hang about the summits of the neighbouring mountains it is well known that an easterly wind is prevailing in the strait, also a white mist hangs over the land, increasing in density as it nears the horizon, and continues while the easterly winds last, even indicating their approach. In general, easterly winds attain considerable strength in a short time, and may freshen to a gale in a few hours. Near the land these winds are often squally, and although scarcely felt on deck, are severe aloft ; the squalls are at times hot, sudden, and give no warning.

When the easterly wind prevails, in the fine-weather season, it is generally more constant and stronger than the westerly wind ; it may

last more than a fortnight, and blow hard all the time. The native seamen say that it always blows for periods of three, six, or nine days.

On this coast, between Cadiz and cape Trafalgar, S.W. winds are the most dangerous. They are generally preceded by a fall in the barometer, and commence from the southward; they veer gradually to S.W., from which direction they blow hardest. Like the S.W. winds of the bay of Biscay, they shift suddenly to West, and even to N.W.; if they continue at N.W. the weather becomes fine, but with occasional heavy squalls and sometimes thunder-storms, moderating as they veer to the northward. The above account of the westerly wind specially applies to winter. In the fine season (April and May) these winds are usually moderate, with fine weather, although the sky may be overcast.

In the Strait of Gibraltar.*—It may be said that two winds prevail in the strait of Gibraltar; they are those from east and west, and known by the local seamen as the Levante and Poniente. These winds are, generally speaking, the results of those from N.E. and S.E., as also from N.W. and S.W. that are blowing outside either entrance of the strait, and which, reaching the narrows, become east and west. Nevertheless, strong south-easters are occasionally experienced in the strait, producing serious damage in the bay of Gibraltar, particularly in winter.

The worst winds of the strait are the S.W., commonly named Vendavales, and in the squalls by which they are attended they veer suddenly to West, or N.W., and even to North, and sometimes N.N.E. Between the squalls there are intervals of fine weather, with moderate wind; and if the wind settles between N.W. and N.E., it moderates, and fine weather ensues. On the contrary, if after suddenly changing to N.W., the wind backs round to S.W., it redoubles its force, and brings rain in abundance.

Winds from N.W. round by north to N.E. are, however, rare in the strait. In the bad season they blow with considerable force; but the local mariners say that, although N.W. winds may blow hard outside, they are not much felt in the vicinity of Tangier bay.

The following table is the result of observations made at Gibraltar and Cadiz between the years 1850–1855, showing the average number of days of easterly and westerly winds for each month during that

* Abridged, with some alterations and additions, from the "*Manual de la Navigation*," by M. Dumolin.

period.* From the table it is evident that easterly winds at Gibraltar predominated during the months of March, July, August, September, December; while at Cadiz the winds most prevalent were from the westward. It also appears that the direction of the wind at Gibraltar is frequently contrary to that experienced at the same time at Cadiz.

DAYS OF EASTERLY AND WESTERLY WINDS.

Months.	Gibraltar.		Cadiz.		Gibraltar.	Cadiz.
	Easterly Wind.	Westerly Wind.	Easterly Wind.	Westerly Wind.	Days of Variable Wind.	Days of Variable Wind.
January - -	8·2	20·6	6·7	12·3	2·2	12·0
February - -	11·2	16·1	8·8	10·6	0·7	8·6
March - -	16·0	13·6	7·7	16·1	1·4	7·2
April - -	12·2	17·3	10·2	13·8	0·5	6·0
May - -	7·3	23·3	4·4	20·2	0·4	6·4
June - -	11·8	16·6	7·7	18·5	1·6	3·8
July - -	18·5	12·2	6·9	19·9	0·3	4·2
August - -	19·5	11·0	11·8	15·5	1·5	3·7
September - -	17·3	12·6	11·0	15·7	0·1	3·3
October - -	12·7	17·3	9·8	14·2	1·0	7·0
November - -	10·5	17·8	8·5	11·4	1·7	10·1
December - -	15·0	13·5	13·4	7·0	2·5	10·6
	160·2	191·9	106·9	175·2	13·9	82·9

From observations made at Tangier in 1825, as compared with those at Gibraltar, there appeared a considerable difference, although these places are only 30 miles apart. At Tangier there were 195 days of westerly, 134 days of easterly, and 36 days of variable winds; at Gibraltar there were 180 days only, of westerly, and 185 days of easterly winds. In confirmation of preceding remarks with reference to seasons of prevailing winds in the above table, Gibraltar shows a result of only 160 days easterly and 192 of westerly, and 14 variable winds; calms were very rare, and it often blew very hard. Again the mean of the daily record for the years 1868-70 gave the following results, by which it will be observed that easterly winds again prevailed:—66 days north, 145 east, 36 south, and 107 west, without an interval of a single calm day.†

* There have been years which navigators have named years of easterly winds, when these have much prevailed in the strait, vessels then being rarely detained in their passage westward. There have also been periods known as years of westerly winds, when it has been especially difficult for vessels to get from east to west, the bays and anchorages along the Spanish coast near the strait affording temporary refuge to hundreds of vessels waiting a spell of easterly wind to get away; instances have been known of vessels having been detained from one to two months waiting to clear this short distance.

† Observations by the Army Medical Department at Gibraltar.

January, February, and March are the months that are generally unfavourable for the navigation of the strait. About the end of October and November there is occasionally bad weather in the strait, it being the time of the short rainy season, which lasts from 15 to 20 days. In January, February, and March, S.W. (shifting to W. and N.W.) and S.E. gales are frequent. These gales are at times very heavy, accompanied by rain, and follow each other at short intervals.

Easterly winds, (known by the name of *Levanter*s) give timely warning of their approach ; on shore, and especially at Algeciras, Gibraltar, and Ceuta, their approach is known 24 hours beforehand. An abundance of dew, a mist over the land, especially over Gibraltar and Apes hill, over the heights of which it hangs in dense masses, are almost certain indications of an approaching easterly wind ; and these continue while the wind lasts ; sometimes a swell from the eastward anticipates the wind. In the strait of Gibraltar the easterly winds have peculiarities differing from those on the coast between cape Trafalgar and Cadiz. They are squally near the land, but in the strait are uniformly strong. In shore, and principally in the bays, a calm prevails both morning and evening ; or the wind is light near the land, while outside, especially in the middle of the strait, it is blowing hard. Easterly winds, instead of being dry, as they are on the coast between Cadiz and Trafalgar, are often very moist. They are generally accompanied by a mist, and the thicker the mist the stronger the wind.

It often happens, and particularly in summer time, that the *Levanter* does not reach cape Trafalgar and Cadiz until two or three days after it has been blowing at Algeciras, where it will often be found blowing fresh, when in other parts of the strait it is calm, or a westerly wind is blowing.

During the fine season, easterly winds are seldom attended with rain in the strait ; but as they cause more moisture in the eastern entrance of the strait than in the western, it often happens that the mist which is formed on the heights of Gibraltar and Apes hill, occasions rain at the foot of these mountains, while there is fine weather in the strait.

In the bad season, usually during February, March, and April, N.E. winds frequently bring rain, and when they veer to East or S.E., they generally freshen to a gale. These winds are squally and back suddenly to N.E. and sometimes North. In these changes they blow hard at times ; however, in changing to N.E. they moderate, but if they again veer quickly to East or S.E. the bad weather will continue. In this season also, easterly gales veer to S.E. and

are accompanied by torrents of rain ; the weather then is nearly always murky, and the sky overcast ; the S.E. is the rainy wind of the strait.

Westerly winds.—When the summits of Gibraltar, and Apes hill, after being covered with mist by a continuance of the easterly wind, become more clear and conspicuous it is a tolerably certain sign of the approach of the westerly wind, and it will be more certain still if the mist or clouds entirely disappear. At Algeciras, Gibraltar, and Ceuta, when the atmosphere becomes dry, or when the lassitude occasioned by the easterly wind is less felt, the westerly wind may be expected ; and when once it has set in, the hills and sky become clear, more especially so if the wind be N.W. A swell from the N.W. or S.W. also indicates the approach of a westerly wind.

In the fine season westerly winds are generally moderate ; the sky is clear, and the land remarkably distinct ; but if they freshen, it soon becomes overcast, bringing squalls and rain, and causing a considerable sea in the strait. In October, November, or December, a strong breeze may occasionally occur from the westward, and though accompanied by much moisture at the western entrance of the strait, is mostly dry at Gibraltar ; from January to April, westerly winds are squally, and attended with heavy rain.

Easterly or westerly winds in the strait are much influenced in their direction by the vicinity of the coast. Thus, when the wind is due West in the strait, it becomes N.W. near the coast of Spain, while near the African coast it is S.W. In like manner, easterly winds in the strait draw to the N.E. near the coast of Spain, and to S.E. near the coast of Africa. As the wind penetrates into the strait, it becomes stronger as it reaches its narrowest part. Thus, although the easterly wind may be light between Gibraltar and Ceuta, it blows hard between Tarifa and Cires point, as well as in all the western parts of the strait. And in the same manner westerly winds, which are moderate between cape Trafalgar and cape Spartel, attain their greatest strength south of Tarifa, and preserve it in all the eastern part of the strait.

Fog.—In the fine season, and particularly in June, if, after a strong easterly wind, large white clouds are seen collected about the land in round masses, with light S.W. or westerly wind, and a thick fog bank is formed in the western part of the strait, it gradually gains on the land, and soon envelopes the whole strait. These fogs are sometimes as thick and wet as those which are met with on the coast of Newfoundland in the month of August ; but they are only of a few hours duration and disappear as rapidly as they form.

Rain.—By observations made at Gibraltar and Cadiz there appears to be considerable difference between the rainfall at the two places. For while at Gibraltar an average of 68 days rain is looked for every year, at Cadiz they have only 18 days. The following table shows the number of rainy days for each month of the year at the two places deduced from observations extending over a period of six years. A column is also attached of the observations made afloat for a different year; from which will be evident not only the great difference between the two places at simultaneous periods, but also the difference between one year and another in places so closely approximate.

DAYS OF RAIN.

Months.	Gibraltar.	Cadiz.	Afloat.	Observations.
January - - -	9.1	2.5	15.5	Afloat at the anchorage of Caraca, or Cadiz, from 17th February to 20th April. On other days in the strait or its vicinity.
February - - -	7.1	1.6	18.0	
March - - -	6.2	2.0	12.0	
April - - -	10.1	1.7	4.3	
May - - -	6.1	1.6	3.5	
June - - -	1.8	0.2	0.7	
July - - -	0.4	0.0	0.7	
August - - -	0.9	0.2	0.2	
September - -	2.9	0.7	2.5	
October - - -	5.7	2.0	3.0	
November - -	9.5	3.8	9.0	
December - -	8.8	2.0	0.7	

It will be seen by the table, that the most rainy month at Gibraltar was not the same as that at Cadiz. At times with S.W. winds rain falls at Tangier while it is dry at Gibraltar; and often while easterly winds bring rain in the eastern part of the strait, it does not reach the western part. It is generally considered that there are two rainy seasons in the strait; one of them, which commences in November and at times in December, or even in the early days of January, seldom lasts more than 15 days. The weather afterwards becomes fine before the heavy winter rains, which sometimes last till May. In the years 1854 and 1855 the short rainy season occurred in November; December was dry; the rains recommenced in January and lasted through the first fortnight of April.

Thunder storms.—Thunder storms are most frequent in the months of September and October; they are not so common in April May, and November, and rarely happen in the other months. They most frequently occur in the afternoon or at night, when the weather is uncertain, and the wind variable. Heavy gusts of wind, but of short duration, blow from opposite points, as from East and West, and clouds are seen, of different elevations, pursuing opposite directions,

which is nearly a certain sign that the evening will not pass without a storm. The local mariners affirm that in the months of September and October about 15 or 20 miles outside the strait squally weather is experienced and most frequently accompanied by thunder.

The squalls are attended with a considerable quantity of rain, with intervals of fine weather and calms or light winds. When these squalls are strong they assume something of the character of whirlwinds, and shift rapidly through four, six, or even eight points of the compass, blowing harder as the changes are more rapid and considerable.

Barometer.—With winds from N.N.W. round by North to East the barometer is generally high, and keeps so even when it rains. But as soon as the wind has any tendency to the southward, it falls, thus a rising barometer indicates a northerly or easterly wind, and a falling barometer the contrary. S.W. and S.E. winds, being those which generally bring bad weather in the strait, are indicated by a considerable fall in the barometer. But frequently this fall only indicates rain, for generally speaking, these changes of the barometer are more frequently followed by rain than by increase in the force of wind.

The following table, the mean result of six years' observation at Cadiz, will convey an idea of the movements of the barometer and thermometer near the strait of Gibraltar.

Months.	Barometer.			Thermometer.		
	Max.	Min.	Mean.	Max.	Min.	Mean.
January - -	30.40	29.49	30.08	68	30	49
February - -	30.40	29.96	30.20	72	41	55
March - -	30.32	29.60	29.88	67	45	57
April - -	30.20	29.49	29.88	82	50	64
May - -	30.08	29.57	29.88	78	50	64
June - -	30.08	29.77	29.88	82	60	68
July - -	30.08	29.80	29.88	90	62	74
August - -	30.08	29.80	29.88	87	58	75
September - -	30.16	29.69	29.88	82	59	72
October - -	30.08	29.60	29.88	82	47	64
November - -	30.20	29.69	30.00	72	41	59
December - -	30.40	29.88	30.08	65	37	53

TIDES AND CURRENTS.—Within the bend of the coast comprehended between cape St. Vincent in Portugal and cape Rabat in Africa, the general direction of the surface current is to the eastward towards the strait of Gibraltar, increasing in strength as the strait is approached, and acquiring its greatest velocity between Tarifa and Cires points. On the coast of Spain the stream runs to the S.E.; on

the coast of Africa it has a tendency to the N.E. It should be observed, however, that S.W. gales cause a northerly current, occasionally setting at the rate of 2 knots an hour; it runs to the N.E. on the African coast, North and N.N.W. on the coast near Cadiz, and N.W. and West towards cape St. Vincent. Near Tarifa the current runs S.E. towards the African shore, and off Cires point to the E.N.E., the mass of water thus combined setting East through the strait, causes a stronger current along the coast of Africa than along the coast of Spain. Continuing in this direction between Tarifa and Europa points, the easterly stream enters the Mediterranean, inclining to the N.E. on the Spanish coast, and to the S.E. towards that of Africa.

The movement of the whole body of water in the strait of Gibraltar, however, is tidal, affected by the above-mentioned surface current running into the Mediterranean from the Atlantic.*

Within a cable of Tarifa the flood at springs runs westward at the rate of 2 to 3 miles an hour; but at neaps it is reduced to little more than one mile an hour. At springs the stream of the tide near the coast and in the bays runs at the rate of $1\frac{1}{2}$ to 2 miles an hour, but at neaps there are places where it nearly ceases. These in-shore streams always run much faster on the ebb than on the flood, thus showing the effect of the general current.

Thus it will be seen that independently of the general current that runs to the eastward through the middle of the strait, there is a regular ebb and flood stream running, the ebb, setting to the eastward and uniting with the general current, therefore when the water is falling, the whole stream in the strait is running to the eastward, attaining, at a cable's distance from Tarifa a velocity of from 4 to 5 knots an hour, and from 5 to 6 knots an hour at 4 miles north of Alcazar point. When, however, the water is rising, the tidal set to the westward meeting the incoming current from the Atlantic is, under ordinary circumstances, overpowered by it in the middle of the strait (where the easterly current is collected into a narrow and rapid stream) though along the shores (at a greater or less distance according to the time of tide) the flood stream to the westward is experienced, but always at a greater distance from the Spanish than the African coast. The velocity of the easterly current during this tide is considerably checked, its rate on the meridian of Tarifa being only from 2 to 3 miles an hour in the middle of the

* From the investigation of the Gibraltar strait current made in H.M.S. *Shearwater*, 1871, by Captain G. S. Nares, R.N.

strait; 2 miles on the coast of Africa, and rather more than one mile in the vicinity of Tarifa. It is only during easterly winds and calms that a decided set to the westward (maximum rate one knot an hour) is experienced in the middle of the strait; the surface current ceases running to the east at one or two hours after low water, and sets again to the east at high water.

The preceding remarks refer only to the surface water; the bottom stratum is unaffected by the in-running current of the Atlantic, and sets east or west for equal periods according to the tide the change in the tidal streams corresponding with the time of high and low water at Gibraltar.

On the shallow ridge at the western entrance to the strait the surface and bottom streams are tidal, the in-running current from the Atlantic not being sufficiently strong to over-run the westerly (flood) stream.

Time of High water.—The tidal wave arrives simultaneously at Mogador in Africa and Conil in Spain, and entering the strait causes high water at the same time on all the coast between cape Plata and Europa point.

It is not, however, until about twenty minutes after it has attained its highest level on the coast of Spain that the water reaches its highest level on the African shore opposite.

It is high water, full and change, with the rise of tide at the several places as mentioned in the following table :—

Places.				High Water, full and change.	Springs Rise.	Neaps Rise.	Neaps Range.
				H. M.	Ft.	Ft.	Ft.
Chipiona	-	-	-	1 30	12·5	8·0	3·6
Rota	-	-	-	1 24	12·6	8·0	3·6
Cadiz	-	-	-	1 56	12·0	9·0	—
Conil	-	-	-	1 18	12·0	7·6	3·3
Cape Plata	-	-	-	1 45	8·0	5·3	2·6
Tarifa	-	-	-	1 46	6·0	3·6	1·3
Algeciras	-	-	-	1 49	4·0	2·6	1·3
Gibraltar	-	-	-	1 47	4·0	2·6	1·3
Ceuta	-	-	-	2 6	3·9	2·6	1·3
Tetuan	-	-	-	2 23	2·6	1·6	0·6
Tangier	-	-	-	1 42	8·3	5·0	2·0
Rabat	-	-	-	1 46	9·12	—	—
Mogador	-	-	-	1 18	10·12	—	—

Eddies or Counter Currents, which are so numerous in the strait of Gibraltar, generally occur in the vicinity of the most salient points of both coasts, and near their off-lying banks. In Tangier bay the ebb stream strikes against Malabata point, a portion of it turns to the south, and runs along the whole shore of the bay in a

direction opposite to that of the current outside of it. Observations show that this effect, which takes place in all moderately deep bays, results in streams as periodically regular as those produced by the tide : only this reversal of the stream does not take place at slack water, like that of the outer current, but at three hours after ; thus it will not be until half ebb at Tangier that the counter stream will run westward ; and the tide will have three hours to rise when the counter stream to the east commences.

In the bay between the points Al Boassa and Cires, the ebb stream, which is strong off the latter point, produces a counter current, while the flood, not so strong, and meeting a less salient point, Al Boassa, is attended with no counter current. In this case, as at Cala Grande, the stream, on coming in contact with the land between points Alcazar and Cires, produces on the ebb a counter current to the west along the coast between them. With the flood stream all the water runs to the west, along shore, and the consequence is that the bay of Cala Grande has this great advantage, that near the shore the stream runs continually to the westward. This fact is of great importance to sailing vessels passing the strait from east to west with foul winds.

In Ceuta bay the counter currents are much the same as in Tangier bay, but weak.

In Gibraltar bay there are also counter currents. On the flood tide the stream enters the strait by Europa point, and sets towards Carnero point ; off which it is divided into two branches, one of which continues on its western course ; another takes the western shore of the bay, making a northerly course from Carnero along by Algeciras ; and as the flood passes Europa point a portion of the stream branches northward, and continues along by Gibraltar to the head of the bay. It there meets with the stream from the western side of the bay, and then, by their combined action, a current to the southward is established down the middle of the bay, until it joins the flood stream which is running in the strait.

Thus, during the flood, there are actually three streams in the bay of Gibraltar, two of which run north along each shore, and, uniting at the head of the bay, form together a current running southward out of the bay. The stream on the western side is much stronger than that on the eastern, it commences at point Carnero as soon as the flood makes there, and in about an hour it reaches Getares bay, but does not penetrate to Algeciras until two hours after the turn of the tide. The stream on the eastern side of the bay does not reach the anchorage off Gibraltar until three hours after the flood makes ; the consequence of which is that the flood stream runs for a shorter period than that of the ebb, and also with much less strength.

As soon as the ebb commences in the strait the tidal stream enters Gibraltar bay round Carnero point, and runs N.E. across the bay. Having gained the head of the bay, it divides; one part running along the shore towards Gibraltar; the other, which is the larger branch, sets round the head of the bay and along the western shore by Algeciras to the south; and thus on the ebb, as on the flood, there are three currents in the bay. These streams are quite periodical, changing regularly with every tide at about two or three hours after high and low water. It has also been observed that these particular currents produced by the general stream of the tide are subject to considerable variation.

Not only has the wind a considerable influence over them, but their velocity and their extent depend much on its force. Off Carnero point the tide runs almost always either N.W. or N.E., and consequently in general towards the shore. Carnero point, or perhaps Acebuche point west of it, is one of the most difficult for vessels to get round from the eastward; besides which, Carnero point is the most dangerous in the whole strait, and many of the accidents in the strait occur here in consequence of the currents above mentioned.

On the east side of Tarifa the flood tide is never sufficiently strong to cause any counter current; but with the ebb, the stream which runs S.E. occasions a counter current along the coast to the westward, which at times is felt some distance eastward of Tarifa.

Tide races.—There are probably few places in which the tide races are more numerous than the strait of Gibraltar. They are generally found off all the salient points of the strait where the direction of the coast changes, and near the banks in their neighbourhood. They form without warning of any kind, the sea gets up like water boiling over a fire, short, irregular, and deep. These races are dangerous, not only for boats, but even for small craft; the wind, of course, contributes to form them, and always augments their violent character. The most turbulent races in the strait are generally where the angle of the point is most acute, and off which the water is not so deep; they are generally formed at half tide, when the current is strongest.

In some parts the stream of the flood, as well as that of ebb, produces these races; in others, the race is only produced on the ebb. The points on the coast of Spain where races are found are,—cape Trafalgar, the Cabezos shoals, the south point of Tarifa, Frayle point the Pearl rock, and Europa point. On the coast of Africa,—cape Spartel, points Malabata, Altares, Al Boassa, Cires, Leona, and the north-east point of Ceuta have also races off them.

Off cape Trafalgar, a race forms both on half flood and half ebb. It extends to a considerable distance off the cape in a W.S.W. direction, crossing the bank of Aceitera, and over all the small banks of the Phare. This race which is more formidable both in extent and violence than any in the strait, most probably arises from two causes, the sudden change of direction in the coast, and the number of banks off it.

At every half tide, a race is also formed on the Cabezos shoals, or near them, varying both in its extent and direction; and sometimes by following the small shoals it becomes considerably extended, although not so violent as the races generally are off the points; it gets up with a troubled sea even in calm weather, and in bad weather, with much sea on, extends over the whole breadth of the strait, from the Cabezos to the flats between Malabata and Al Boassa points, on the African coast.

The race off Tarifa point is comparatively of limited extent; on the ebb it extends to the S.E., but with the flood S.W. It appears at every half tide, and that on the ebb is generally more considerable than that on the flood. The races off Frayle and Europa points are much the same as those just mentioned, the first resembling that of the Cabezos, and the last that of Tarifa; their only difference is in being less extensive and less violent.

On the African coast, off cape Spartel, Judios point, and Tangier point, the races are generally of small extent and of little importance, although they are found both with the ebb and the flood. The worst races are between Malabata and Al Boassa points, over the Almirante, Phœnix, and Jaseur banks, and, as above mentioned, reach across the strait to the Cabezos. The races off Cires, Leona points, &c., as far as Ceuta, are of small extent: they are sometimes rather violent, like the tide which produces them: but this is only on the ebb. In fact, in the strait, and principally to the northward of Tangier, there are occasional eddies as well as counter streams at springs, but they are of small extent and short duration.

CAPE SPARTEL SOUTHWARD TO MOGADOR.*

JEREMIAS ANCHORAGE, about $3\frac{1}{2}$ miles southward of cape Spartel, is much resorted to by vessels prevented from entering the straight of Gibraltar by strong easterly winds. At a mile from

* See Admiralty charts:—Strait of Gibraltar, No. 142, scale, $m = 0.7$ of an inch; Africa, West Coast, Strait of Gibraltar to river Gambia, No. 1,226; scale, $d = 1.4$ inches; Africa, West Coast, sheet 1, Cape Spartel to Azimur, No. 1,227; scale, $m = 0.13$ of an inch.

Chapter VII. of this volume being in part identical with Chapter II. of African Pilot, part I., the Mariner should consider which book contains the latest information.

the shore there are about 20 fathoms water, over clean sandy bottom, and good holding ground. During the prevalence of easterly winds it is preferable for vessels wishing to enter the strait to keep over on the African coast rather than the Spanish, as it is free from danger, and they are in a better position to profit by any change in the direction or force of the wind; for this purpose it is prudent for a sailing vessel to keep under sail.

Directions.—When approaching the strait of Gibraltar from the westward if a levanter comes on, stand well to the southward, and work up to bring mount Nipple, about 3 miles south of cape Spartel, to bear E. $\frac{1}{2}$ N. before anchoring. From this position to the southward heavy squalls are not generally experienced. A good berth may be had in 24 fathoms, and at half a mile from the shore there are 7 fathoms.

H.M.S. *Vulture* in 1872 anchored at Jeremias anchorage in 14 fathoms water, with a white marabout tower (the only building in the vicinity), bearing S.E.

Caution.—There is a depression in the land south of cape Spartel, which might be taken for the entrance to the strait of Gibraltar at night, when the low land cannot be seen. This error may be avoided by attention to the soundings.

THE COAST from cape Spartel trends nearly straight in a S.W. by S. direction for 19 miles to Arsila, and, with the exception of a few rocky projections, is formed by a clean sandy beach with a line of low hills, which from the distance of half a mile inland, slope gradually to the beach. Thirteen miles farther inland there is a range of very conspicuous mountains, the loftiest of which, named Jebel Habib, is about 3,000 feet above the level of the sea, and makes a good landmark for Arsila. Another peak, mount Raven, lies 6 miles farther northward and 10 miles inland, and is about 2,200 feet high. Both of these peaks are of a regular conical form.

Arsila.—Close north of the town of Arsila there is a Portuguese castle, but now in ruins; date trees, which rise above the walls, are growing in the court. Under the southern angle of the castle is a whitewashed tomb of a Mohammedan saint. The country in the neighbourhood of the town is well wooded, and much land is laid out in gardens.

Anchorage.—There is a good anchorage on this part of the coast; a good berth is in 15 fathoms, on a bottom of sand and small shells at $1\frac{1}{2}$ miles from shore, with cape Spartel bearing N.E. $\frac{1}{2}$ N.

and the town of Arsila S. by W. $\frac{3}{4}$ W. distant 5 miles ; farther to the southward, in 13 fathoms, coral rock will be found mixed with gravel, when the centre of Arsila town bears S. $\frac{1}{4}$ E. distant $2\frac{1}{2}$ miles. There is reported to be a mackerel fishery about this part of the coast on which 20 or 30 Spanish and Portuguese feluccas are employed during the fishing season.

Caution.—It is against the law of Marocco for any person to land on a part of the coast where there is not a port for their reception.

Coast.—From Arsila the coast continues in the general direction of S.W. $\frac{1}{2}$ S., and presents nearly the same appearance, the depth at a distance of 3 miles from the shore being 25 to 30 fathoms, gravel. At 4 miles south of Arsila the coast hills rise to a height of about 700 feet. Haffat-el-beida, or the White cliff, situated 8 miles south of Arsila, stands about 300 feet above the sea, and presenting in all directions the form of a wedge, serves to identify this part of the coast. The face or section of this cliff shows the strata lying at an angle of 70° with the horizon.

El Araish.*—About 8 miles south-west of White cliff is situated El Araish, on the steep southern point of the Wadi el Khos (the bow), which here meanders through a fertile valley ; the sudden bends in the river having probably suggested its Arabic name. A large castle on the summit of the hill, a lofty mosque, and several towers, give this town an imposing appearance when seen from seaward ; this, however, soon vanishes on approaching it. The environs are laid out in gardens, from whence the town derives its name (El Araish, signifying a pleasure garden), but they are in a very wild uncultivated state ; in 1886 El Araish had a population of about 4,000 persons. No census is taken. The only disease due to climate is intermittent fever in the summer months.

Landing even in the fine season is difficult and dangerous.

Bar.—On the bar at the entrance of the Wadi el Khos at low water there is a depth of 5 or 6 feet, deepening inside to 24 feet. The river takes an abrupt turn to the northward, and in the bend vessels moor.†

Trade.—In 1886 the value of the exports from El Araish amounted to 61,000*l.*, and that of the imports to 111,890*l.* In the same year 268 vessels, including steam-vessels, of all nationalities,

* See plan :—El Araish on Admiralty chart, No. 1,227 ; scale, $m = 1$ inch.

† The channel across the bar is at present closed.—*Shipping Gazette*, 2nd March, 1890.

entered the port. The aggregate tonnage was 24,993 tons. The exports consisted of beans, Canary seed, peas and wool; the imports, of cotton, manufactured silk, raw sugar, loaf sugar, tea and woollen cloth.*

Quarantine.—Vessels are liable to quarantine.

Communication.—Steam-vessels call here.

Tides.—It is high water, full and change, at El Araish at 1h. 30m.; springs rise from 9 to 12 feet.

Anchorage.—The best anchorage in the outer road of El Araish for vessels intending to enter the river is about a mile off shore, in 12 fathoms, on a sandy bottom, with a conical mountain, named Jebel Sarsar distant 25 miles, appearing in the centre of the entrance, bearing S.S.E.; or in 10 fathoms with the north entrance point bearing S.E. by E. $\frac{1}{2}$ E. distant about $1\frac{1}{4}$ miles. The pap, or rising ground, on the north side of the river is 200 feet above the sea.

Old Mármora.—About 21 miles southward of El Araish is situated the outlet of a stream reported to flow from a small inland lake; on the north point of the entrance there are several tombs kept well whitewashed, the most prominent of which is named after Mulair-Abu-Sallūm. Though the coast is straight, there is tolerable anchorage off this river during the summer; at 2 cables from the bar of the river there is a depth of 5 fathoms, gradually increasing to 34 fathoms, at 2 miles off shore. The coast between El Araish and Old Mármora is generally about 300 feet high, with reddish cliffs for the northern 10 miles, and then sand-hills partly covered with brushwood.

Rocky (Artlett) Shoal lies 15 miles southward of Old Mármora, and one mile off shore; it has 8 fathoms on it, with 13 fathoms between it and the shore. From Rocky shoal, Black rock bears E.S.E.

Mehediya or New Mármora lies 60 miles S.W. from El Araish. The town stands on the lower slope of a hill which rises to the height of 456 feet, on the southern bank of the Wadi Sebu. It is celebrated for its ruins; the population, who are not friendly to Europeans, is reported not to exceed 400; they subsist by the sale of a fish resembling salmon (shebbel).

Anchorage.—There is good anchorage off Wadi Sebu during summer, there being 16 fathoms, muddy bottom, at a distance of

* The import trade is increasing, it being more convenient to receive goods here than at Tangier, especially in the winter, when, owing to the roads being better, the transport to the interior is cheaper.—*London Gazette*, 22nd October, 1889.

2 miles from the shore, but in winter S.W. and S.S.W. winds render it unsafe. Vessels approaching the land in the latitude of Mehediya will strike soundings in 100 fathoms, coarse sand, when distant about 18 miles from the shore, and will shoal to 50 fathoms at the distance of about 8 miles from the coast.* During a calm, vessels are at times obliged to anchor in order to avoid being drifted on shore by this current setting along the coast to the southward. The sea is discoloured for a long distance off shore, abreast of the entrance of the river.

Coast.—From Mehediya the coast trends in a south-west direction, generally resembling that before described, but is rather more level, and wooded.

Sali.—At the distance of 17 miles south-west of Mehediya the town of Slá, or Sali, stands on the northern bank, and near the mouth of the river Abú Regreg. It is encompassed by a wall 35 feet high, strengthened and flanked by towers at regular distances.

Rabat.†—The town of Rabat extends along the opposite or southern bank of the river Abú Regreg, and is larger than Sali. The population of both together is estimated at 30,000.

Rabat is defended by fortifications which extend round the river and sea faces of the town. Both towns are remarkable for their white walls and minarets. Fever and ague are prevalent in the summer, but are avoidable by using ordinary precaution.

Trade.—The value of the imports during the year 1886 amounted to 98,304*l.*, and that of the exports to 40,069*l.* The exports were chiefly sheep's wool; the imports principally British cotton goods. During the year 1886, 61 vessels of all descriptions and nationalities, with an aggregate tonnage of 25,737 tons, entered the port. Nearly all of these were steam-vessels, which had to anchor outside.

Supplies.—Beef, chickens, and vegetables can be procured. Soles are caught at the mouth of the rivers.

Communication is by steam-vessels with Gibraltar, London, and Marseilles.

Hassan Tower.—This tower, situated south-eastward of the town of Rabat, is 180 feet in height, and, standing on a cliff which

* A bank, on which the sea breaks heavily, has been reported off Mehediya; 11 fathoms water was found close to the breakers, which were about 3 miles from the land, and W. by N. $\frac{3}{4}$ N. from the fort of Mehediya. The bank is supposed to have been formed by the Lebon river.—United States Sailing Directions, No. 46. West Coast of Africa, Vol. I. of 1873.

† See plans:—Rabat and Sali on Admiralty chart. No. 1,227; scale, *m* = 1 inch.

rises 70 feet above the river, may be seen from a distance of 15 or 20 miles.

Tides.—It is high water, full and change, at Rabat at 1h. 46m. (approximately) ; springs rise 9 to 12 feet.

Anchorage.—The best anchorage in Rabat road is with Hassan tower just open of the south entrance point of the river, and 2 miles from the shore, in 21 fathoms, mud, or a steam-vessel in fine weather might anchor in 10 fathoms at $1\frac{1}{4}$ miles off shore, with Hassan tower in line with the east angle of the fort.

Depth on Bar.—A sand-bank which dries at low water is situated at the mouth of Abú Regreg river. The bar is dangerous to any but the smallest coasting vessels. At spring tides there is not more than $6\frac{1}{2}$ to $7\frac{1}{2}$ feet water on the bar, except in a narrow tortuous channel, which only a steam-vessel could navigate. The channels are both liable to changes.*

Landing.—There is always a heavy rolling swell on the bar, but with the aid of local pilots it may be crossed in two places ; it is, however, very dangerous, as the banks constantly shift, and cause the loss of many coasting vessels. Landing is effected in lighters kept by the Government, ordinary boats being unfit for the purpose.

Coast.—The first conspicuous object, situated 7 miles W.S.W. from Rabat, and built on the slope of a hill, is Massa tower, 190 feet high ; and 22 miles farther in the same direction, the little town of Mansuriya will be seen, the principal mosque of which is 180 feet in height.

From Rabat to cape Fedala there is no danger at a distance of 3 cables from the shore, and the bank of soundings to the 100-fathoms line is upwards of 20 miles in breadth and tolerably regular. At 22 miles N.W. of Rabat there is a depth of 162 fathoms, whence towards the shore it suddenly shoals to 90 and 80 fathoms, between which depth and that of 60 fathoms the bottom for many miles is of fine sand and mud. The coast between Rabat and cape Fedala slightly recedes, but the inland features scarcely vary in appearance ; two lines of barren and gently undulating hills running nearly parallel to the coast. The distant hills are from 200 to 400 feet high, and lie 5 or 6 miles from the sea, while the coast range is not more than 200 feet in height, nor more than a mile from the beach, on which many patches of rock are intermixed with the sand, and down to which they gradually slope.

* The sand-banks at the mouth of the river are reported to have considerably increased.—*London Gazette*, 22nd October, 1889.

CAPE FEDALA.—Five miles west of Mansuria is situated the village of Fedala, with a projecting cape to the westward of it, which when seen from a short distance has the appearance of an island, and affords some shelter to the small bay in front of the village.

Anchorage.—Vessels may anchor there in 5 or 6 fathoms, but very near the shore.

Banks.—N.E. by E. from cape Fedala, distant 6 miles, there is a bank of 17 fathoms from which others extend about 9 miles in an E.N.E. direction parallel with the shore, and at a distance of about 3 to 4 miles from the coast. The least water on these banks is 15 fathoms, and there is deep water between them.

Cape Dar el Beida bears W. $\frac{3}{4}$ S. distant 13 miles from cape Fedala. Reefs extend from it to the distance of nearly half a mile, and farther off, northward of the cape, there is a rocky bank of 6-fathoms; a safe distance at which to pass the cape is 3 miles.

Anchorage.—Northward and eastward of cape Dar el Beida the bottom is rocky in many parts of the bay between it and cape Fedala; this must be a very unsafe anchorage during the winter, not only from its foul bottom, but from the current, which sets obliquely on the shore, rendering it difficult for a vessel when weighing to clear it with an on-shore wind. A good berth for a steam-vessel is three-quarters of a mile off shore in 10 fathoms sand, with the centre of the wall of the town of Dar el Beida (Daralbaida) bearing S.S.W., and the fort, which is a white tower, bearing S.W. by W.; or in $6\frac{1}{2}$ fathoms hard sand, with British consulate flagstaff bearing S.W., and the extreme of the north-west fort bearing West.

Dar el Beida is also generally known by the name of Casa Blanca. It was once a place of importance; the adjacent country is said to be very fertile. The population is about 10,000, of whom about 200 are Europeans.

Light.—A private harbour light is exhibited (but is not to be implicitly relied on) from Dar el Beida. It is a *fixed* white light, showing a sector of *red* over West reef, and visible 7 miles off in clear weather.

Communication is by steam-vessels of the regular British and French lines, trading on the coast.

Supplies.—Provisions are the only supplies to be had for shipping. These are plentiful and cheap.

Coal.—A small quantity might be got from the proprietor of a

mill in an emergency. Coaling is performed in the bay from lighters with bags.

Landing.—The landing place is a narrow entrance, with a sandy bottom about 40 yards wide, with reefs on either side, over which the surf breaks in almost all weathers. If it blows at all hard from the west or N.W. all communication between the shipping and the shore is cut off.

Trade.—In the year 1886 the value of the exports at Dar el Beida (Daralbaida) was 260,784*l.*, and of the imports 197,961*l.* The number of vessels of all nationalities which entered the port was 105 sailing and 115 steam-vessels, with an aggregate tonnage of 91,796 tons.

Immense quantities of mackerel are found off Casa Blanca during several months in the year, whither Portuguese fishing craft occasionally resort to catch these fish with hook and line, using short rods ; and salt them down for the home or Spanish market.

Quarantine is strictly enforced.

Coast.*—From Dar el Beida the coast runs nearly straight in a S.W. by W. $\frac{3}{4}$ W. direction for a distance of 35 miles to Azimur point, the eastern 2 miles being rocky, but the rest a broad sandy beach, inside of which two parallel ranges of hills, of 300 and 400 feet in height, rise at the distance of 2 and 6 miles from the sea, and are partially covered with brushwood. Several tombs are seen on this part of the coast.

Azimur.—At Azimur point the coast suddenly bends southward to the mouth of the river Wad-um-er-Rebia (mother of herbage), on the south bank of which, and 120 feet above the sea, stands the town of Azimur.

Bar.—The river has a bar of sand across its mouth, which dries nearly across at low water ; on the inside it is reported to be deep and rapid.

Effect of refraction.—“As we approached the town,” says Lieut. Arlett, R.N., “towards sunset it was refracted through the haze into a magnificent looking place, and a tomb in the centre of the town had the appearance of a stately cathedral ; but the morning light showed all to be mere heaps of ruins.”

Cape Mazighan.—From cape Mazighan a reef extends more than a mile to the north-eastward, with shoal water beyond it.† This reef

* See Admiralty chart :—Africa, West coast, Sheet ii., Azimur to Santa Cruz No. 1,228 ; scale, $m = 0.13$ of an inch ; with plans of Mazighan and Safi bay.

† The reef was reported as extending farther off in 1882.

somewhat shelters the anchorage for small craft in westerly winds, notwithstanding which a heavy swell rolls in.

A Shoal, with 4 fathoms on it, gravel bottom, lies east from the north extreme of cape Mazighan distant $1\frac{1}{2}$ miles from the shore; vessels should not attempt to pass between this shoal and the coast.

Directions.—Cape Mazighan should not be approached nearer than 2 miles.* A small mosque, situated about $1\frac{1}{2}$ miles eastward of the town, should be brought to bear S.W., until the ruined tower at Mazighan bears west; this latter mark then kept on, leads to a good anchorage in 7 fathoms, mud and sand, about one mile from the town.† Further eastward, in the eastern portion of the bay, the general depth is from 7 to 10 fathoms, fine dark sand, but this would be a wild and dangerous anchorage during winter. The sands on the south-east side of the bay are said to be of a shifting nature, and wrecks are not uncommon.

Mazighan.—The small town of Mazighan stands on a low rocky point, 8 miles westward of Azimur, the coast between forming an extensive bay. The town or rather fortress of Mazighan known to the Moors as Burjah (fortress) is well situated for defence, being nearly at the extremity of the cape. The fortifications are of a quadrangular form, but the armament is obsolete. The British Consulate occupies the site of one of the four flanking towers. The chief tower, about 150 feet high, is conspicuous from seaward. In 1886 the population was 3,000.

Landing is difficult at low water, but may be easily effected after half flood in a camber on the east side of the town.

Supplies.—Beef and mutton are abundant and cheap, fish and vegetables of excellent quality are easily procurable; a limited supply of water can be obtained from wells. There are no ship's stores to be had.

Trade.—The value of the exports during the year 1886 amounted to 202,503*l.*, and of imports to 216,166*l.* In the same year 108 steam and 137 sailing vessels entered and cleared, of an aggregate tonnage of 89,816 tons. Spanish five franc pieces and pillar dollars are chiefly used.

* Navigating lieutenant W. P. Haynes, H.M.S. *Aurora*, 1873.

† In running for the anchorage bring the large tower in the town in line with the N.E. bastion of the walls, bearing S.W. by W., at least 4 miles distant, then run S.S.E. for 2 miles before heading up for the town, where good anchorage is in 8 fathoms water, at less than a mile from the landing place. U.S. Notice to Mariners, 1882.

Quarantine is strictly enforced in time of epidemics on vessels arriving from infected countries.

Communication is by British and French lines of steam-vessels from and to London and Marseilles.

Coast.—Between Mazighan and North cape Blanco, distant 11 miles in a S.W. by W. $\frac{1}{2}$ W. direction, the coast should not be approached nearer than 2 miles, as detached rocks lie off the shore, and the soundings are very uneven. The beach also, though in many places a broad sand, is generally fringed with rocks. A barren range of hills, 200 feet above the sea, slope to the beach throughout its extent, and terminate close northward of cape Blanco, in a low, dark, and rocky cliff. At about 4 miles north-east of cape Blanco are the ruins of the town of Tett, among which a tower 128 feet high and 148 feet above the sea is conspicuous from the offing.

NORTH CAPE BLANCO, in latitude $33^{\circ} 8' N.$, longitude $8^{\circ} 36' 20'' W.$, probably derives its name from a white cliff, 170 feet high, a little southward of the headland that forms the cape; it is named north cape Blanco, to distinguish it from the other cape of the same name situated in latitude $20^{\circ} 47' N.$

Anchorage.—The bight on the south-west side of cape Blanco is reported to afford a temporary anchorage, but only for summer use.

Soundings.—At 19 miles N.W. by N. of North cape Blanco, a depth of 111 fathoms, gravel, will be found, and at 22 miles N.W. by W. from the cape there is 100 fathoms, broken shells, from whence it shoals gradually to the shore.

CAPE CANTIN.—From a position 3 miles north-west of North cape Blanco, to 3 miles north-west of cape Cantin, that rises precipitously 200 feet above the sea, the course is S.W. by W. $\frac{1}{2}$ W., and distance 47 miles. Cape Cantin is known as Ras-ul-Hadik or Palm grove cape.

Four miles southward of North cape Blanco a dark cliff projects from the shore, which when seen from some directions has an insular appearance. About 6 miles southward of North cape Blanco the hills rise gradually from the beach to the height of 450 feet, and appear to be the highest land on this part of the coast. About 10 miles south-west from the cape, near the coast, there is a black tower with some ruins near it; and 21 miles farther to the south-westward, the ruins of El Waladieh may be seen on the shore, with a smaller group of ruins $2\frac{1}{2}$ miles south-west of them. There is said to be here an extensive lake, communicating with the sea, but the boats of H.M.S.

Raven during the survey in 1835 did not discover the entrance; it was probably concealed by the high surf which breaks upon this forbidding shore. At 4 miles north-eastward of cape Cantin, the profile of the land, which is here about 450 feet above the sea, begins to lower gently, but close to the cape it again rises into a hummock, on the outer edge of which there is a white patch, seen both from the northward and southward, and apparently the site of a former town. A singular gap in the ridge of the cape is also seen when either north-east or south-west of it.

Current.—Northward of cape Blanco the current generally sets to the south-westward at the rate of about half a knot an hour; north-west of cape Cantin the current usually has the same direction, but a velocity of about $1\frac{1}{2}$ knots an hour.*

Westerly swell.—Between cape Spartel and cape Cantin allowance should be made for a heavy swell that generally sets directly on the coast.

Soundings.—At 16 miles to the westward of cape Cantin, soundings may be obtained in 100 fathoms, fine sand; and 11 miles westward of cape Cantin, soundings may be obtained in 40 or 45 fathoms, sand and shells, decreasing irregularly to the cape, from which a reef or sandy spit extends to seaward for a distance of $1\frac{1}{2}$ miles, with 5 fathoms on its extremity; at 3 miles W.N.W. from the cape the depth is only 17 fathoms.

Cape Safi, the northern point of Safi bay, bears S.S.W. distant 12 miles from cape Cantin; the intermediate coast is a continuous line of white cliff with a broad sandy beach at its foot; the cliff gradually rising to 500 feet high at cape Safi, which may be known by a square tower, said to be the tomb of a celebrated Moorish saint.

Safi bay.—At cape Safi the land suddenly recedes to the south-eastward forming Safi bay, and the cliff drops into a ravine, the bed of a winter torrent. On the slope of the hill which rises from the south side of this ravine, stands the town of Safi, or more properly Asafi, a place of considerable antiquity and importance, but which has only a population of about 6,000. The town may be distinguished a long way off by the whiteness of its walls and buildings. The towers of the principal mosque have an elevation of 200 feet. Water is scarce, and during the summer it has to be procured from wells at

* In the offing north of cape Cantin a set of $1\frac{1}{2}$ miles an hour to the south-eastward was experienced in November 1871.—Remark book of Navigating Sub-lieutenant E. S. Greaves, H.M.S. *Lee*.

a short distance southward of the town. The country in the neighbourhood appears from seaward to be sandy and barren, but travellers assert that it is remarkably fertile.

Trade.—During the year 1886 the value of the imports amounted to 64,700*l.*, and that of the exports to 125,992*l.*

Anchorage.—Safi bay, during the summer months, affords as good anchorage and smoother water than any other on the coast of Morocco, but it is entirely exposed to westerly winds; the bottom is of sand and mud, and there is generally a depth of about 15 fathoms at a mile from the shore, shoaling gradually to 5 fathoms at a few yards from the rocks. Small steam-vessels, if prepared to quit at short notice, may anchor off the town, with the citadel on the highest part of the town bearing E. by S., distant one quarter of a mile.

Landing.—The landing at Safi is at all times bad.*

Wadi Tensift.—At 7 miles southward of Safi, a red cliff named Sharf-el-Yahudi, or Jews cliff, rises to a height of 280 feet above the sea. Ten miles farther south-westward is the mouth of Wadi Tensift, the principal river of Morocco; the general features of the coast throughout the space between Safi and Wadi Tensift are high sand-hills, sometimes terminating in low cliffs, and occasionally in sloping points, backed by hills above 600 feet high, covered with brushwood; Wadi Tensift, though a considerable river in the interior, had, in the month of August 1835, its bar entirely dry at low water. On the northern bank of the river there is a castellated building in ruins.

Coast.—From Wadi Tensift the coast trends in a S.W. by W. $\frac{1}{4}$ W. direction for a distance of 9 miles to the tomb of Sidi Abdalla Bettak; and farther on, other tombs with the ruins of a town will be seen at the base of the Iron mountains. The coast, which from Wadi Tensift is barren and uncultivated, and from 200 to 300 feet in height, here shows renewed signs of cultivation. Jebel Hadid, or the Iron mountains, a large mass of high land extending more than 20 miles in length, rises to the height of 2,300 feet; and on one of its summits the tomb of Sidi Wasman forms a very conspicuous object, useful in recognizing the land, and verifying the position of a vessel.

Hadid point.—At 45 miles S.W. $\frac{1}{4}$ W. from cape Safi is situated a sandy spit named Hadid point, which projects a mile beyond the

* Captain S. Douglas, H.M.S. *Aurora*, 1873.

general trend of the coast, terminating in a reef half a mile in length ; at $1\frac{1}{2}$ miles west of the point the depth is 8 fathoms.

Coast.—From Hadid point the sandy beach continues in a south-west direction for a distance of 12 miles to Mogador ; the view inland being bounded by the high Botof sand-hills, covered with dark bushes, which extend parallel to the beach at about a mile inland.

Soundings.—At 6 and 7 miles from the coast, between Safi and Mogador, the depth is 25 and 20 fathoms, whence, it gradually decreases to the shore, except off Hadid point.

MOGADOR.*—When approaching the land on the parallel of Mogador, the first remarkable features which are seen are the distant craggy summits of mount Atlas, capped with snow, and contrasting with the dark ridges of intermediate hills ; while to the northward, the Jebel Hadid, or Iron mountains, appear like a large island. On a nearer approach to the shore, a narrow white streak of sand-hills fringed at the top with verdure, seems to rise out of the sea ; and at the distance of 8 or 10 miles the mosques and castles of Mogador begin to be distinctly seen, as well as the low black island which fronts it.

Soundings in 100 fathoms may be obtained at a distance of 22 miles from the shore, on the parallel of Mogador, eastward of which the water almost immediately becomes discoloured ; from the depth of 78 fathoms the soundings decrease gradually, the 50-fathoms line being about 8 miles from the shore.

Town.—Mogador, or Suïra, dates only as far back as 1760, when the Sultan Mohammed Ben Abdalla, having been attracted there by the wreck of a European vessel, laid its foundations. Unlike those of any other town in his dominions, they were planned by a Genoese architect, with some little attention to convenience and regularity ; and the effect was so pleasing that it received the name of Suïra or the Beauteous Picture, it is, however, better known to Europeans by its more ancient name of Mogador. The town stands on a low sandy spot, which is surrounded by the sea at high-water springs, and the adjacent ground is therefore a swamp.

Mogador consists of two parts, the citadel, and the outer town, in which is the Jew's quarter, isolated and enclosed by a wall, with forts at the principal angles. In 1886 the population was 15,000, of whom 150 were Europeans, and between 5,000 and 6,000 Jews.

* See Admiralty plan :—Suïra or Mogador harbour, No. 1,594 ; scale, $m = 4$ inches.

Landing.—Boats may land at high water alongside at the sea gate, or they may pass under the bridge and reach a more convenient landing place on the other side; but at low water the whole place is dry, and then the landing is on the reef. These must all be approached through a channel between the reefs to the southward. When there is not enough water to land at the Custom house, a small dredged channel, a little to the eastward, can be used by small boats.

Fresh water.—Formerly there was a great want of water, as the river is a mile and a half distant, but an aqueduct now conveys the stream to several large tanks built in different portions of the town. One of these has been placed very conveniently for the vessels in the harbour, as it lies close to a jetty inside the fortified bridge; and boats may fill there towards high water, perfectly sheltered from all winds.

Supplies.—No ship's stores nor furniture. The market is excellent; provisions of all sorts, including poultry and game, are abundant and cheap, as are also fruit and vegetables. The price of beef is regulated every day by a superintending officer. The hook and line fishermen of Mogador, when not stopped from working, as they often are in summer, by strong north-easters, and in winter by southerly and westerly weather and heavy seas, make fair catches of various bream, with conger and muræna, skate and thornback, bass and mullet, and many other fish, both European and local. Crayfish and lobsters are plentiful, as well as large prawns. Soles and turbot of excellent quality are caught in nets.

Coals may be obtained as a favour in small quantities. Vessels coal in the bay, from lighters, with baskets.

Repairs.—There are no facilities for repairs.

Quarantine.—Strict quarantine is enforced in time of epidemics, on vessels coming from infected countries.

Trade.—The port charges for merchant vessels are high, as well as those for ballast. Boat-hire is also expensive, owing to the number of boats that are every year destroyed by the surf.

In 1886, 81 steam and 18 sailing vessels entered, of an aggregate tonnage of 57,242 tons. Imports were valued at 255,091*l.*, and exports at 311,493*l.* The imports consist of bagging, brass ware, candles, coffee, cotton goods, cloth, drugs, earthenware, hardware, glass, gum, hides, iron, silk, spices, sugar and tea; the exports chiefly of goat-skins, ostrich feathers, gums, almonds, olive oil, beeswax, citrons, seeds, and beans.

Except for the Moorish government, the importation of tobacco, opium, arms and gunpowder is prohibited ; and the exportation of live animals, wheat and barley, and weapons of all kinds.

Communication.—The vessels of the Mersey Steamship Co., from London, call fortnightly, touching at Gibraltar and the ports on the coast ; and also the vessels of the French Compagnie de Navigation Marocaine, which leave Marseilles, calling at Gibraltar, continuing to the Canary islands and thence back by the same route. Mogador is the southernmost port open to Europeans.

Mogador island, about half a mile long and a quarter of a mile broad, lies half a mile from the opposite beach, and three-quarters of a mile south-west of the town ; it rises about 94 feet above the sea, and except upon the eastern side is surrounded by extensive detached islets and reefs, which extend $3\frac{1}{2}$ cables from its south-west extreme : the shores are clifly and defended by several batteries.

A high islet, nearly joined to Mogador island, lies off its north-east extreme, and immediately north-east of this islet there is a rock above water.

Mogador harbour, or, as it is generally termed, Mogador bay, is formed by a double bight in the coast line ; the northern part of which is somewhat sheltered from the long Atlantic swell by Mogador island.

To enter.—The north entrance affords a clear channel, about 3 cables wide, with from 4 to 6 fathoms water in it ; but in the harbour the depth decreases to 3, 4, and at the most 5 fathoms, on a rocky bottom with only a superficial covering of sand, and the clear space for anchoring is contracted to little more than half a mile in length and the same in breadth by reefs extending from the town point, and by the 2 fathoms flat which extends from the shore to Mogador island.

Leading mark.—The sanctuary of Sidi Mogodol kept on a S.E. by S. bearing, leads safely in through the north entrance.

Anchorage.—The actual extent of the anchoring berths is of small dimensions ; vessels generally haul close in to the eastward of the middle of the island, and anchor at little more than half a cable from the shore, and therefore in only 14 or 15 feet at low water, loose sandy bottom. A more central position in the bay and in deeper water would be directly open to the swell of the Atlantic, which occasionally sets in with great violence, even in moderate weather. The greater facilities for discharging cargo induce merchant vessels to anchor in the eastern part of the harbour, well under the shelter of

the rocks that extend off the town. With the prevalent north-east wind, this northern entrance is so distinct as to require no further directions than to keep in mid-channel.

South entrance.—The bight southward of Mogador island is never used as an anchorage, but vessels of not more than 12 feet draught find it more convenient to cross the flat between the island and mainland, and to run *out* in that direction with the benefit of the current, than to work out through the northern entrance. The lead will be a sufficient guide not to deviate much from midway between the island and the opposite shore, in passing through this south channel ; or the great mosque of Mogador, standing near the beach, in line with a house with an angular roof (the only one in the town), leads across that flat in the deepest water.

This channel is said to be filling up.

Caution.—Vessels should moor in Mogador harbour, with a very short scope of cable and open hawse either to the northward or southward, according to the season of the year. From November to April this bay can scarcely be considered tenable, although it has often been asserted that vessels with good ground tackling need be under no apprehension. The nature of the bottom, however, shows that no reliance can be placed on the hold of the anchors ; and the necessity of veering more cable to a westerly gale, will increase the exposure of the vessel to the effects of the swell which rolls round both extremes of the island, and which again reacts from the opposite shore.

In case of parting from the moorings in a gale it would be very difficult to save the vessel or even the crew.

Anchorage for steam-vessels.—A good berth for small steam-vessels is in $4\frac{1}{2}$ fathoms, with the north-east extreme of Mogador island bearing W. $\frac{1}{4}$ N., and the ruined battery on the mainland south of Mogador island, bearing S.S.W.*

Mogador road.—Vessels of more than 14 or 15 feet draught would find it imprudent, unless in fine summer weather, to anchor in the harbour ; and if intending to remain but a short time, anchorage

* With reference to Notice to Mariners, No. 225 of 1887, that the French steam vessel *Vérité*, partly destroyed by fire in July 1887, was lying sunk a little inshore of the usual anchorage, Mogador (Suirah harbour) :—

Information has been received from Commodore A. T. Powlett, H.M.S. *Actiee*, dated 5th November 1890, that the wreck of the *Vérité* (iron hull), no portion of which is visible, and is a danger to navigation, lies in 4 fathoms at low water spring tides, with the following bearings and distance :—

Mosque on Mogador island	...	...	...	W. by S. $\frac{1}{4}$ S.
Fort (ruin), northern side of harbour	...	...	...	N. $\frac{1}{4}$ W., distant $4\frac{1}{2}$ cables.

NOTE.—During the stay of the *Actiee* the position of the wreck was shown by a caak buoy moored with rope ; which probably might soon be washed away and not replaced.

can be obtained outside Mogador island, open indeed from S.W. round by North to N.E. by E., and at all times exposed to a long swell, but comparatively safe in summer. A good berth is in 13 fathoms, fine dark sand, good holding ground, with the fort west of the custom house bearing S.E. by E., and the rocky points at either extreme of Mogador island S. by E. $\frac{3}{4}$ E., and S.W. by S. This roadstead is three-quarters of a mile from the shore, and the pilots consider it the best outer anchorage, though the holding ground is loose. Large vessels had better lie in the road at all seasons.

Caution.—During the winter months, S.W. winds spring up with but slight warning, rendering anchorage in the road dangerous; and with the first sign of more than an ordinary swell setting in, especially with a falling barometer an offing should be sought, for in moderate weather a swell sometimes breaks heavily across the entrance, making it difficult to get out, even with steam.

Tides.—It is high water, full and change, in Mogador harbour at 1h. 18m.; springs rise 10 or 12 feet. The tides are generally regular in their rise and fall, but the direction of the tidal stream varies with the wind, and its strength is at all times weak.

Current.—The current in-shore at Mogador is reported sometimes to set to the northward; but farther seaward it always sets to the south-westward. In the offing between Mazighan and Mogador a set of 2 knots per hour to the S.S.E. has been experienced in November.

Winds and weather.—N.E. winds with fine weather prevail from March to December; the breeze generally falls during the night sometimes to a calm; the sea becomes smooth, but rises again in the morning; during the remaining three months the winds are variable and the weather stormy.

East and S.E. winds are rare; they are locally known as the simoon, and are dry and hot, and while they last, which is fortunately of short duration, great discomfort is felt.

Southerly winds are usually gentle, and accompanied by fog; these winds generally veer to N.W. before dying away.

Gales usually blow from W.S.W., and are preceded by a falling barometer, the horizon is overcast with heavy dark clouds, which move rapidly; a fine rain commences and is soon followed by the gale.

The climate of Mogador is agreeable, the range of the thermometer being from 64° to 70° F.

Diseases.—Diseases of the eye are prevalent, mostly among the Jews; the crews of vessels are subject to a kind of gastric fever, which lasts from three to four days and then subsides.

INDEX.

	Page		Page
Abaña river	231	Alcantara shoals	364
Abila mountain	425	Alcazar point	427
Abrela beach	260	Al-Djezirah town	414
Abū Regreg river	452, 453	Aldan bay	320
— anchorage	453	— anchorage	321
— bar	453	— dangers, directions	321
— landing	453	— depth of water	321
Acebros point	248	Alemtejo province	368, 372
Acebucho point	410	Algarve province	372
Aceitera shoal	403	Algeciras mole, town	414
Acho, monte del	431, 432	— anchorage	415
Achuri point	160	— communication	414
Adour bar	132	— customs and quarantine	414
— beacons	134	— life-boat	416
— river	132	— life-saving apparatus	416
— depth of water	132	— tides	416
— directions	136	— trade	414
— jetties	132	Algorta village	175
— lights	133	— sands	180
— rifle range	134	Algoz river	376
— tides	136	Aljesur town	372
— outside anchorage	137	Allé point	157
Africa, coast of	421	Alluard rock	94
African rock	301	Almadraza sandhills	387
Agudo del Sabin rock	235	Almanza bay, point	428
Aguieira rocks	314	Almida de Ceuta	433
Aguillon point	233	Almina	432
— rock	233	— point	433
Aguillones cape	269	Almirante tower	415
— islets (dangers)	270	— rock	426
Agulha rock	372	Alpeidão shoal	359
Ahorcado headland	189	Altare point	426
Aiguille, point, de l'	103	Alto de Caixas light	359
Aiguillon point, light	106	— Barril	374
— bay, directions	108	— Lequeitio, mount	163, 167
— Tour d', light	93	— del Limo cape	270
Aix, ile d', roads, light	111	— de Plencia	173
— tides	116	— de Ruballo	198
Ajo cape, inlet, village	194, 195	Altos de Meca	402
Alameda Alta de Santander	202	Alturas de Arnó, mount	162
Albarquel fort	370	Alvor town	375
Al Boassa point	427	Alzacarría point	157
Albufeira lake	367	Amandarri point	167
— light	377	Amboto mountain	180
— point, bay, town	376	Ampuero village	190

	Page		Page
Amuck islet	144	Arenal del Puntal	198
Ançã beach	377	— de Traba de Lage	298
Ancora river	333	— Vega	222
Andalusia	326	Arenas playa de las	179
Andre river	367	Arenilla point, tower	383
Andujar town	386	Arezoa town	333
Anduz mount	161	Arca bay	286
Angoulême... ..	113	— anchorage... ..	286
Angueiro point	312	— tides	287
Animas shoal	403	— cape	367
Ano castle	196	— castle	286
— channel and mount	191	— inlet	284
Anse du Fret beacon	44	— anchorage	285
Ansion islet... ..	201	— town	286
Antimon-arria rock	157	Arguesto islet	170
Antioche pertius d', directions	111	Arichaohú beach	172
— rocks	110	Arland bay	22
Anuales reef	241	Ar Men Guen Gondiohoc	24
Anzaron island	262	— rock, light	38
Anzora bay and point	170	— fog signal	38
Anzuela islet... ..	257	Armenta village	173
Apes hill	429	Arnao beach	239
Apiquel point	168	— castle	225
Aquech islet... ..	173	— town	239
Aquila point	202	— bay	251
Arabi el Said fort	423	Arnó mount	162
Aramo mount	161	Arnosate mount	162
Aran valley... ..	118	Arosa bay	313
Aranarri rock	156	— anchorage	314
Arando Chico	150	— directions	316
— points	147, 148	— island	313
Arañon rock... ..	240	— lights	315
Arcachon, bassin de	129	— pilots	315
— anchorage	130	— tides	315
— tides	130	Arrabida mountain, fort	367, 368
— coal	130	Arrangasiá point	161
— communication	129	Arribaton rock	156
— customs and quarantine	129	Arriederra islet	169
— depth of water	129	Arrifana point, battery	372
— docks	129	Arribobajo point	151
— hospital	129	Arroas islet	324
— population	129	Arrobado point	221, 222
— supplies	129	Arrocabala point	155
Arcas point	238	Arrocas shoals	307
Ardèche	89	Arrosiñas shoal	307
Ardevenne point	72	Arrubia rock	151
Area Brava point	321	Ars haven	106
— de Bois point	313	Arsila, town of	449
— islet, bay	261	— caution	450
— Mayor	308	Arteagu town	171
Arena-longa beach	273	Artedo bay	243
Arenal de Berdicio	238	Artha rock	139
— Moriz	222	— breakwater	139, 141

	Page		Page
Artibas, river, bar	162	Azimur point, town... ..	455
Artimon, plateau de l'	81	Asurara town	336
Artlett shoal	451		
Arvert point	116	Baca rock	217
Asadoiros bank	312	— de Luanco	237
Asno shoal	206	— point	233
Aspa pyramid	373	Badaxeira rock	272
Asperilla tower	286	Badene church	79
Astigarraya town	150	Baguenaud rock	87
Atalaya (La Malaya) mount, light	160	Baguio village	173
— de Bermeo... ..	172	Baja ialet	256
— Castro Urdiales	185	Bajeta de Tierra shoal	408
— Conil	402	Bajo Borneira	323
— point	150, 171	— buoy... ..	323
— de Malpica	295	— Dado Con	321
— Muros	310	— Seijo	314
— Son	310	— Ter rock	314
— Vega	246	Baldayo bank	295
Atalayas points	222	— beach	295
Atalayero bank	295	Baleal point	350
— island	295	Baleas de Tosta rocks	298
Audierne bay, port, lights	53, 54	Baleines point, life-boat, and light, 106, 107	
— life-boat, tides	55	— reef	108
Auguste point	319	Baliera bay	367
Auray river	76	— point	374
— town	76	Balise de la Grique beacon	129
Avarenta point	285	Ballota point	199, 205
Avarizo port	296	Balloto point	215
Ave river	336	Bañagues bay and river	233
— bar	336	Banc de la Coubre buoy	126
— dangers	336	— de Guérande	84
— light	336	— des Charpentiers	88
Aveiro, new bar, peaks, tower, town	344	Bancha la, shoal	152
Avelamar	356	Banche la, bank	88
Aven, river	64	—, light	89
— light	64	Banco del Bergantine	199
Avilés bay	240	— de las Quebrantas	198
— harbour works	239	— de Rota	393
— buoy	240	Bannec isle	24
— pilots	240	Bañobre bay	288
— river	238	Bar rock	227
— lights	239	Baradero de Meca cove	404
— directions, tides	239, 240	Barayo river	246
Aya mount	154	Barbafeita point	314
Ayamonte, town, castle, lights, 379, 381, 382		Barbanza Sierra de, or mountains of	311
— bar	380	Barbate bay, river	404
— coal	379	— anchorage	405
— communication	379	— river, depth of water	405
— hospital for sailors	379	Baroa point	299
— population	379	Bárceña town	191
— repair of vessels	379		
— trade	379		

	Page		Page
Barcoenal	210	Basse Froide	61
Barges d'Olonne ledges	103	— de Gavre	71
Baril Rond, le, rock... ..	70	— de St. Gildas	79
— le, rock	61	— du Grand Mont	79
Barometer	12	— Hergo	83
Barquero anchorage	264	— Hikeric	84
— caution	266	— Inconnu	84
— coast	266	— de l'Iroise	39, 40
— depth of water	265	— Jaune	49, 57
— inlet	263	— St. Jaques	32
— anchorage	266	— di Ker Joanno	79
— light, directions	265	— Lacroix	65
— mole	265	— Large	29
— port, town	264	— Laye	48
— signal station	265	— Lomariaker	79
— tides	265	— Lovre	87
— water and supplies	265	— du Lis	40
Barques des, port	114	— St. Louis	32
Barqueta bay... ..	224	— Malvie... ..	58
Barra point	203	— des Mats	82
Barranco shoal	415	— Ménéhom	47
Barre à l'Anglaise	125	— Michand	88
— Marine shoal	104	— du Milieu	77
Barreta island	377	— Milit	65
Barril alto, de	374	— du Morbihan	79
Barrosa wood	400	— Muer	32, 49
Barroco point	246	— Neuve	49
Barsa la, rock	314	— Nouvelle	73, 77
Bartolomé chapel	324	— Occidental	78
Barurdo cove... ..	166	— St. Pierre	33
Barzic rock	63	— des Pierres Noires	27
Basofias, las, bank	311	— Paille, de la	70
Basque road	111	— du Palais	74
— tides	116	— St. Paul	33
Basse de l'Aigle shoal	102	— Pérenés	57
— Allaire	25	— des Péres	96
— Astrolabe	39, 88	— du Pouldu	54
— Beuzec	39	— du Renard	44
— des Bossemen... ..	29	— Rip	48
— Boureau	32	— Rouge shoal	57
— Bridy	21	— Royale... ..	29, 34
— des Bretons	66	— de Thumiac	79
— Callet	22	— du Turc	88
— Capella	84	— de Vermenou	103
— Cardinaux	78	— Vieille... ..	48
— Cariou	73	Bassin d'Arcachon	129
— Castonillet	84	— anchorage	129
— des Chats	66	— coal	130
— du Chenal	34, 58, 70	— depth of water	130
— de Dinant	47	— life-boat	130
— an Ero... ..	57	— tides	130
— des Fourches	33	Bastresses rocks, les	68-71
— Fornic	54	Basuril patch	291

	Page
Batallera mount ...	140, 144, 154
Batel rock ...	282
Bâts church tower, de ...	82
Baxo Picacho shoal... ..	386
Baya reef ...	310
Bayes beach ...	241
Bayona islands ...	321, 329, 330
— dangers ...	321
— puerto de, town ...	325
Bayonne town ...	132
— coal ...	134
— communication ...	133
— directions ...	136
— docks ...	134
— foundry ...	133
— hospitals ...	133
— harbour works ...	134
— lights ...	133
— population ...	133
— signals ...	134, 135
— tides ...	136
— trade ...	133
Beaulieu wood ...	79
Bec de l'Epois ...	98
— light... ..	98
— Melen semaphore ...	66
— du raz ...	50
— ar vechin point ...	64
Bedon river ...	218
Beg-an-tour point ...	65
— en Aud... ..	71
— miel high land, point ...	57, 61
— Morg point ...	64
— semaphore ...	64
Begoña point... ..	175
Belem tower ...	362
— light ...	360
Belixe fort ...	373
Bellas ...	355, 356
Belle-Ile ...	73
— anchorage... ..	75
— caution ...	75
— depth of water ...	74
— dock ...	74
— lights ...	74, 75
— semaphores ...	74
— tides ...	75
Belon river ...	64
Belveignou ledges ...	26
Benencia island ...	314
Benites point... ..	431
Béniguet island ...	24, 76
— passage du ...	78

	Page
Béninou baie, de ...	22
Benodet bay ...	60
— anchorage ...	61
— directions ...	61
— lights ...	60, 61
Benzus bay and rock ...	430
— anchorage ...	430
— fresh water ...	430
Berdiceo arenal de, or beach of ...	238
Berguis point ...	221
Berlenga island ...	351
Bermea islet ...	238
Berneja tower ...	400
— point ...	396, 430, 431
Berneio bank ...	276
— cove ...	172
— harbour ...	173
— tides ...	173
— town ...	173
Bernet point ...	129
Bérria beach ...	193
— isthmus ...	189
— playa, de ...	194
Bertheaume, de chateau ...	39
— Anse ...	37
Bertrand rock ...	82
Besaya river ...	204
Bestias castle ...	323
— point ...	327, 331
Betanzaira rock ...	299
Betanzos inlet ...	284, 288
— anchorage... ..	288
— depth of water ...	288
Beva tower ...	390
Beuzec church ...	63
Biarritz ...	138
— anchorage ...	138
— baths ...	138
— communication ...	138
— population ...	138
Bidart village ...	138
Bidassoa river ...	142, 143
— depth of water ...	144
Bidio cape ...	244
Biduido shoal ...	322
Biera Alta pontoon ...	347
Bilbao ...	177
— bay ...	175
— bay, depth of water ...	176
— cathedral ...	177
— Chamber of Commerce ...	177
— caution ...	179
— coal ...	179

	Page		Page
Bilbao communication ...	178	Blaye lights ...	123
— customs and quarantine ...	178	Bluiniers shoal ...	87
— directions ...	180	Boaviagem convent... ..	362
— docks ...	178	— beacon ...	362
— freshes ...	179	Bocal light ...	228
— harbour works ...	178	— point ...	227
— hospital ...	178	Boeiro rocks ...	322
— life-boat ...	179	Bœufs, chaussée des... ..	97-101
— lights... ..	176, 177	Boiro hills ...	348
— Misericordia ...	177	Bois de la Chaise, rade du ...	98
— Museum ...	177	Boîte du Shoal ...	101
— pilots ...	179	Bolonia bay and town ...	406
— population ...	178	Bonanza town, light ...	387, 388
— semaphore ...	176	Bonne Anse shoal, tower ...	95, 118
— shipbuilding yard ...	178	Bonneau rock ...	102
— signals ...	180	Boqueron patch ...	403
— smelting works ...	177	Bordeaux ...	119
— supplies ...	178	— careening ...	120
— telegraph cable ...	179	— coal ...	120
— theatre ...	177	— communication ...	119
— tides ...	179	— customs and quarantine... ..	119
— town hall ...	177	— docks ...	120
— trade ...	178	— harbour works ...	120
— winds... ..	176	— hospital ...	119
Birvideaux, plateau de ...	73	— navigability ...	119
Biscarosse beacon ...	181	— population ...	119
Biscay, bay of ...	9	— tides ...	124
— caution ...	14	— trade ...	119
— directions ...	165	Borderun semaphore ...	73
— soundings ...	9	Borénis rock... ..	82
— winds, weather ...	11	Boria mount ...	211
— currents ...	13, 142	Borizo island ...	217
— province, general remarks... ..	163	— point ...	216
— winds ...	164	Bornalle bay ...	310
— lightning ...	165	Borneira monte ...	272
— barometer ...	12, 165	— point ...	323
— currents ...	165	Bossemen rocks ...	29
Bispon point ...	281, 282	Botof sandhills ...	460
Bizocarraya point ...	159	Bouc rock ...	47
Black fort ...	337	Boucaut le ...	137
— hill ...	412	Boufoulac rock ...	27
— rocks, rock ...	27, 144	Bouja point ...	309
Blanca point, tower... ..	430	Boundary between France and	
— lighthouse ...	245	Spain ...	138
— tower ...	401	Boreau bank ...	34
Blancas rocks ...	272	Bourée rock ...	425
Blanche abbey ...	96, 98	Bourgneuf bay ...	95
— bank... ..	96	— anchorage ...	97
Blanco cape, monte ...	248, 297	— dangers ...	96
Blancs Sablons bay... ..	30	— directions ...	98
— anchorage ...	30	Bouteye shoal ...	321
Blavet river ...	67	Bouzas ...	328
Blaye town ...	118	— church ...	330

	Page		Page
Cachopo shoals	358	Camariñas, directions	300
Cachop shoals	358	————— rock	307
Cacilhas	356	————— tides	300
———— point	358, 360	————— town	299
Cadabal islet	289	Camiña (Caminha) town	327, 332
Cadiz anchorages	394, 399	Camiño road	392
———— bay	393	Camoco islet	286
———— city	390	Camorro point	410
———— coal	391	Campamento village	416
———— communication	391	Campana shoal	295
———— dangers	396-398	Campel point	247
———— depth of water	390, 393	Campelo monte	274
———— directions	398	Campillo battery	176
———— diseases	391	Camp bay	418
———— docks	392	Campo islet perch	431
———— hospital	391	———— rocks	431, 433
———— life-boat	396	Camucos rocks	316
———— lights	393	Caña Coja reef	426
———— mole	390	Canal du Midi	118
———— mountains	389	Canalon del Sabin cave	235
———— pier and wharf	390	Canales islets	215
———— pilots	396	Cañaveral reef	404
———— population	391	Candas bay ; town	231, 232
———— semaphore	393	———— dangers	232
———— supplies	391	———— life-boat	232
———— telegraph cables	396	———— port	232
———— tides	394	Candalaria point and tower	271
———— time ball	392	Candiña mount	188
———— torpedo caution	394	Candor point... ..	389
———— trade	391	Canduas river	297
———— water	391	Caneiro river... ..	245
———— winds	394	Canela island, lights	379, 381
Cagollo point	241	Cangas bay	323
Caillou shoal buoy	87	———— village	330
Cairos point	254	———— church	331
Cala Arena beach	411	Cangrejeiro bank	259
———— Baja beach	426	Caño (channel)	392
———— grande bay	427	Cantaros peaks	346
Calaverojondo point... ..	215	Canterio ledge	312
Caldebarcos point	305, 307	Canteros point	297
Calderon point	206	Canzo, peak	189
Calha point	361	Cantin Cape	457
Cale town	338	———— current, soundings	458
Callo islet	210	———— shoal	101
Calonge canal light... ..	123	Canto bank	206
Calvario hill	167	Cañuelo del Puerto	396
Calallo bay	298	Caosa bay	255, 257
Camaret, anse de	46	Capelada monte	271
———— buoys	46	Capella basse... ..	84
———— depth of water	46	Capilla de la Peneda, mount and	
———— tides	47	chapel	331
Camarinal point	405	Capitania	199
Camariñas bay	298	Capuchin convent, pyramid	54, 55

	Page		Page
Capucins point, light	87	Cascaes fort	361
Carabela bank	250, 253	Casilda island	208
Caramullo peak	344, 346	Casquets	137
Caransa cove	278	Castañar shoal	232
Carballo rock	251	Castel rock	24
Carbonera hills	417	— bras	56
— tower	386	— Raet rock	57
Carcabeiro islet	288	— ar Moulignuet rock	24
Cardál point	162	Castelli point	83
Cardenal fort	305	Castelos del Grallal rocks	260
Cardinaux Les	86	— de Laguete rocks	262
Caresiñas point	312	Castillejos cliffs	401
Cares river	214	Castillo point	210, 238, 332
Caridad village	248	— light-tower	239
Cariño bay	280	Castilobo tower	401
— directions	269	Castra la point	187
— inlet, depth of water	268	Castrelus point	251
— point, town	268	Castrelos point	264
Carmelite convent	396	Castro bank	249
Carnero point	263, 411	— Barra buoy	328
— light	411	— del point	328
Carnota beach	305	— hummock, islet	187, 233
Carraca	392	— Marin town, creek	379
— arsenal	392	— point	310
— ledge	302	— Urdiales, bay	185, 186
Carrameiro shoal	323	— depth of water	186
Carrandi mount	221	— directions	187
Carrapateira fort, point	372	— light-tower	185
Carrastrada point	206	— tides	186
Carayas rocks	251	— Verde bank	187
Carregoza peak	343	Costron de San Yusti islet	214
Carreira reef	295	Castropol village	252
Carriero dos Cações inlet	351	Castros de Agueiro	322, 329
— do Mosteiro inlet	351	— da Barra	323, 328
Carrero channel	226	Catalan tower	382
— beacons and lead- ing marks	231	Catalazete fort, point	363, 364
Carreros point, reefs	221	Catasol point	297
Carril town	315	Cats bridge	51
Carrocedo river	216	Cavaco gate	343
Carrumeiro chico rock	306	Cavado, pico, de, la	193
— viejo islet	306	— river	335
Cartaya town	383	— depth	335
Carvoeiro cape, light	350	Caballos de Faõ ledges	335
— cape	376	Caxias, turret of	361
— fog signal	350	Cayon harbour	294
Casa Blanca	454	Cé cape	304
Casa Branca house	344	— light	307
Casa de los Torreros	385	Ceballos point	175
Casa Santo point	298	Cedeira port	272
Casbah castle	423	— depth of water	273
Cascaes bay	354	— directions	274
— anchorage, light	354, 355	— light	273
		— tides	273

	Page		Page
Cela point	275	Chaussée de Seine dangers ...	51
Celorio bay, islets	217	Chauveau point	106
Celstiges cape	267	———— light-tower	107
Centolo islet	302	Chay light	122
Cerda battery	196	Chazo point	314
Cerdigo rock	188	Cheminées rocks	28
Cerno beach	285	Chemoulin bank buoy	87
Cerrodo mount	187	Chenal, basse du	73
Cervignon point	225	———— du Four	32
Centa bay	431	———— depth of water	32
———— anchorage	432	———— directions... ..	34
———— artificial harbour	433	———— de la Helle	35
———— break-water	433	———— du Nord	87
———— lights	433	———— du Sud	95
———— depth of water	431	Chevaux, chaussée de	77
———— life-saving apparatus	434	———— isle... ..	77
———— light	434	———— ledge, les	97
———— tides	433	Chèvre, cape de la	36
Cévennes	89	———— rock	47
Cezimbra bay, town	367	Chevreaux, le	47
Chancelas point	318	Chevrier bank	126, 127
Chancharde point	106	Chiolana	400
Chanchineiras islets	255	Chiens Perrins rocks	100
Chantiero bay	281	Chipiona light and point	387, 388
Chantarrecas cove	166	Chirlateira point	272
Chason bay	238	Chiviguete rocks	72
Chapelle la, bank	10	Chlec, le rock	52
Charente river	113	Chorente point	299
———— directions	114	Chouzanin rock	244
———— lights	114	Chouzano islet	244
Charniers point	96	Chubillo mount	151, 152
Charpentiers, banc des	88	Cicero river	190
Charras canal	114	Ciervana village	175
Chassiron point	110	———— cove	181
———— semaphore	110	Cies islands	321
Chat le, rock	51	———— dangers	322
Chateau le, town	110	———— lighthouse	329
———— gridiron	110	Cillero village, port... ..	261
———— port, lights	111	Cintra convent	353
Chato rock	233	———— mountains	353
Chats, des, rocks	65	———— town of	353
———— point	65	Cires bay, mount, and point	427, 428
Châteaulin river	44	Ciscada point... ..	286
Chaume jetty light	104	Civray	113
———— lifeboat	105	Cleu Basseven bank... ..	26
Chaussée du Beniguet	77	Clerigos steeple, los	340
———— de Boufs	97	Climate, Arcachon	129
———— de Chivaux	77	———— Brest	42
———— de Keller	22	———— Cadiz	391
———— des Pierre Noire	27	———— Corcubion	305
———— de Seine	36, 51	———— Coruña	290
———— caution	51	———— El Araish	450
		———— Ferrol	279

	Page		Page
Climate, Lisbon	356	Combrit point, light	61
— Mogador	464	Comillas port, village	208
— Oporto	338	— depth of water	208
— Rivadeo	251	— tides	208
— Rochefort	114	Commerce, tour du, light	93
— Vivero	261	Communication (Steam) Algeciras	414
Có bank	262	— Arcachon	129
Coal, Arcachon	129	— Bayonne	133
— Ayamonte	379	— Bilbao ...	178
— Bayonne	134	— Bordeaux	119
— Bilbao	179	— Brest ...	42
— Bordeaux	120	— Cadiz ...	391
— Brest	42	— Corcubion	305
— Cadiz	391	— Coruña ...	289
— Corcubion	305	— Dar el Beida	454
— Coruña	290	— El Araish	451
— Dar el Beida	454	— Faro ...	377
— Ferrol	279	— Ferrol ...	278
— Gibraltar	418	— Gibraltar	418
— Gijon	228	— Gijon ...	228
— Huelva	384	— Huelva ...	384
— Lisbon	356	— Lagos ...	375
— Mogador	461	— L'Orient...	67
— Nantes	91	— Lisbon ...	356
— Oporto	338	— Mazighan	457
— Orient L'	69	— Mogador	462
— Pasages	148	— Nantes ...	90
— Rivadeo	252	— Oporto ...	338
— Rochefort	115	— Pasages ...	146
— Rochelle	113	— Pontevedra	319
— Sables d'Olonne	104	— Rabat ...	452
— Saint Nazaire	92	— Rivadeo ...	251
— San Sebastian	153	— Rochefort	115
— Santander	197	— Rochelle	112
— Setubal	369	— St. Nazaire	91
— Vigo	327	— San Lucar	
— Villa Real	379	— de Bar-	
Cobe, la, rock	99	— rameda	387
Cobos ledge	312	— Santa Maria	391
Cochon, le, ledge	64	— Santander	197
— rock	71	— Setubal ...	369
Cochons les, rocks	64	— Sines ...	370
Cochinos rocks and beacon...	396	— Tangier ...	424
Coelleira island	263	— Tavira ...	378
Cognac	113	— Vigo ...	327
Congrée la, rock, buoy	117	— Villa Nova	
Coin point	224	— de Porti-	
Coitelada point	278	— mão ...	376
Colinas islets	243	— Villa Real	379
Colindres channel	190	— Villaviciosa	224
Colunga river	222	— Vivero ...	261
Comba bay	275	Con point	320, 323
Combarro bay	318	— rock	310

	Page		Page
Con de Baixeu rock	314	Coroubion bay light... ..	307
Concarneau harbour	62	———— pilots	307
———— depth of water	62	———— repair of vessels ...	305
———— directions	63	———— telegraph	307
———— lights	62	———— tides (Cape Finis-	
———— pyramids	62	terre)	308
———— tides	63	———— town	305
———— winds	62	———— trade	305
Conceicao church	378	Cordero rock	233
Concepcion fort	273	Cordonan light-tower	121
Concelho woods	348	———— plateau de	125
Condepego point	320	Cordova mount	363, 367
Conejera bay	224	———— town	386
———— island, light	263, 265	Corme bay	297
Conejos island	203	Cormorandière rock... ..	44
Congrée, la, rock	117	Corn-Vas shoal	64
Congregados hill	339	Cornoc-ar-Vas-Nevez	51
Congrera point	264	—— an-ar-Braden	51
Conil shoals, town	401, 402	—— an Tréas rock	50
Conos rocks	237	—— Bras shoal	38, 52
Conquet, town, haven, church	25-30	Cornorio cape	238
———— life-boat	31	Cornuda point	201
———— tides	32	Coroño, height of	226
Consolation fort	350, 352	Corrales shoal	398
Contis light-tower	131	Correal bay	241
Coq, le, rock	39	Corrobedo cape	312
—— pointe de and light	60	———— life-boat	313
Coral island	428	———— light	313
Corbal islet	285	———— village	312
Corbera point	254	Corsen point	30
Corbeiro point	316	———— light	30
Corbeau light	100	Corúna bay	288
—— passage	41	———— anchorage	290
—— point	100	———— buoys	291
—— rock and tower	41, 100	———— caution	292
Corbera point	247	———— climate	290
—— rock	198	———— coal	290
Corberas rocks	237	———— communication ...	289
Corbero islet	249	———— customs and quarantine	290
—— mount	220	———— dangers	291
Corberon islet	246	———— depth of water... ..	289
Corbin rock	40	———— docks	289
Corce rock	22	———— directions	293
Coroubion bay	304, 305	———— hospitals	290
———— anchorage	305	———— life saving apparatus... ..	290
———— climate	305	———— lights	290
———— coal	307	———— pilots	292
———— communication	305, 307	———— port regulations	292
———— customs and quaran-		———— repairs to shipping ...	289
tine	305	———— supplies... ..	289
———— dangers	306	———— tides	292
———— directions	308	———— trade	289
———— life-saving apparatus	307	———— winds	290

	Page		Page
Corven de Trévignon rock...	64	Current	13
—— le, rock	63	—— Cape Cantin	458
Corzan rock	314	—— Trafalgar	402
Coto house	400	—— Rannel	13
Coto de Castro hill	254	—— Gibraltar Strait	443-448
Cotos de Balbao mountain...	253	—— Ortegale cape	270
Cotolina point	185	—— Portugal	13
Coubre point, light and light-vessel	121	—— Prior cape... ..	276
Couronnée rock	96	—— St. Vincent cape	373
Couso point	321	—— Ushant	13, 15
Covanin rock	232	Cygogne islet	56
Crac'h river lights	80		
Crasto hill	339	Dado-Con reef	321
Creac'h point and light	20	Dames point lighthouse	98
Créac'h Meur point	37, 39	D'Ardevenne point	72
Cristina island	381, 382	Darland bank	23
Cristobal mount	280	Dar el Beïda	454
Croisic point, haven, town...	82, 83	—— cape	454
—— anchorage	83	—— coal	454
—— asylum	83	—— communication	454
—— coal	83	—— light	54
—— communication	83	—— population	454
—— docks	83	—— quarantine	455
—— lights... ..	85	—— supplies	454
—— quarantine	83	—— trade	455
—— trade	83	Dax river	132
Croix fort, light	62	Deba islet	241
—— la beacon light	99	Deixo point	285, 286
Cromic rock	25	Demi bank	125
Crozon town	50	Deva river	160, 183, 214
Cruces point, mount	146, 147	—— depth of water	161
Cruz point	192, 249	—— pilots	161
Cuadro point... ..	271	—— tides	161
Cuartas battery	175	Devil's tower	419
Cudillero port	243	Devin point	101
—— lighthouse	243	Diamant rock, le	27
Cudio hill	198	Diamante shoal	397
Cuerno de Candaa point	232	Dichoso point	206
—— islets	298	—— alto del	206
—— point	203, 298	Dicido port	186
Cuerno de Barayo point	246	Digne du Cardinal	112
Cuervo shoal	295	Dinant bay	47
Custo village... ..	202	—— point	47
—— de Miño	185	—— Anse de	36
Cueva battery	193	Direction mount	423
—— de Pomba patch	295	Do-Porto Piedra shoal	288
—— Ladrone point	216	Do-rios bay	275
—— port	245	Doble bank	193
Cuevabaja point	264	Domingo point	271
Cuevas de Mar Beach	219	Doniños plain, beach	276
Curbeiroa point	288	—— lagoon	276
Curbina rock... ..	294		
Curota peak	311		

	Page		Page
Dôr mount	333	El Acho castle and hill	432
Dordogne river ... ,...	118, 119	— Waladiyeh ruins	457
Douarnenez bay, village	48	Emballo bay	239, 240
———— anchorage	49	Endaidi houses, cove	166
———— dangers	48	Enes Nein point	22
———— directions	50	Enfer point	66
———— tides	50	Engaramada point	247
Donélan port... ..	64	Enmedio, sierra de	407
———— four rock and tower	64	Enquieira point	302
———— lights... ..	65	Ensenada de Aldan	320
———— semaphore, near	64	Entornada point	224
Donellan rocks	22	Entrellusa, peton de	232
Douro river	337	Entre Rios tower	416
———— anchorage	341	Eo river	251
———— approaching the bar	340	Erbosa point	275
———— aspect	339	———— isle	236
———— bar	341	Erdre river	90
———— signals	341	Ericeira village	250
———— directions	343	Ero reef	57
———— freshets	342	Errants rocks, les	68
———— life-boats	342	l'Ervily, point de	54
———— light	339	Er Spernec bihan beacon	78
———— navigability	338, 341	Esba river	245
———— pilots	342	Escairo point, rock	254
———— precautions	342	Escalante, town of	191
———— semaphore	339	Escalara peak	189
———— tides	342	Escaleiron islet	273
Dreneo island	56	Esclassiers rocks, les	77
Dueso village	189	Escoubiac church, mill	87
Dumet isle	83	———— sand hills	87, 96
Duyo rock	307	Escudo mount	211
East bank	146	Espagnols point	46
Eastern Bossemen	29	España bay and river	225
Eigil mount	273	———— passages de	146
Eiras point	274	Espante point	268
Elanchove town	169	Espartal plain	239
El Agudo peak	155	Espasante bay and village	268
El Araish town	450	Espejo de Pasages	150
———— anchorage	451	Espera, la, mooring buoy	232
———— bar	450	Espichel, cape	366
———— climate	450	———— anchorage	367
———— communication	451	———— fog bell	368
———— landing	450	———— light-tower	368
———— population	450	———— semaphore	368
———— quarantine	451	Espiga rocks	233
———— trade	450	Espinhos huts	343
———— tides	451	Espirito Santo, sierra del	242
— Cabezon buoy	328	———— castle and point light	387, 388
———— reef	324	Espozende town	335
— Diamante shoal	397	———— light	336
— Frayle shoal	396	Esquilletac les, shoals	139
		Estaca point	249, 267
		———— life-saving apparatus	267
		———— light-tower	267

	Page		Page
Estallans point	312	Feira castle, heights, town	343, 344
Estaño rocks	225	Felgueira rock	340
Estaquin islet	267	Felgueiras mole	340
Estay, cape	325	Fenegueira peak	311
Esteiro bay	259	Ferbedeira rock	294
— beacon	362	Fernelo beach	306
— rivulet	310	Ferrazo point	315
— town	278	Ferret, cape	128, 129
Estela de Mar island	325	Ferro monte	325
— Tierra island	325	Ferrol harbour	278
Estéllas islets	352	— anchorage	280
Estordi village	304	— buoys	279
Estrélla dome	362	— caution	284
— mountains	346	— channel	280
Estrivela town	318	— depth of	
Etang de Carcans lake	129	— water	280
— Lacanau lake	129	— climate	279
Etel river	72	— coal	279
— life-boat	73	— communication	278
— light	73	— customs and qua-	
Eume river	287	— rantine	279
l'Euménide rock	78	— directions	283
Europa point light	413	— docks	279
Eve. pointe de l', light	93	— hospitals	279
Ezaro bay	305	— lights	282
		— measured mile	
		— beacons	277
		— population	278
		— repair of vessels	279
		— rescue station	280
		— semaphore (Segano)	281
		— supplies	279
		— tides	283
		— town	278
		— trade	278
		— winds	283
Facho monte	312	Fertiñanzo point	318
Fagilda bank	316	Fief point lights	107
— point	317	Fiers d'Ars	107
Faisans or Pheasants islet	143	Figar bank	231
Faix le, rock	35	Figo monte	374
False Tinas	212	Figueira harbour, dock, town	347
Faõ town	335	Figueiras village	257
Farallones de San Ciprian	256	Figuerras bay, village	251, 252
Farelo rock	299, 301	Filette rocks	37
— monte	299	Filgueira rock	310
Farilhoes islets	352	Finisterre cape, navé	301
Faro de Domayo mount	330	— caution	302
— point	259	— fog signal	303
— monte, lighthouse	260, 329	— lighthouse, village	303, 304
— town	377	— rocks and shoals	302
— communication	377	— signal station	303
— directions	377	— tides	308
— mount	223		
— population	377		
— supplies	377		
— trade	377		
Fasouro point, river	254		
Fedala cape	454		
— anchorage	454		

	Page		Page
Finisterre life-saving apparatus ...	307	Fromantine mountains ...	99
Flaharn rock... ..	64	Fromveur, passage du ...	23
Flotte la, haven ...	106	— directions ...	23
Foia mount ...	371	— Men Tensel rock ...	23
Fomento mole ...	228	— tides ...	24
— new basin ...	230	Frouxeira point, lake ...	274
Fontan point, village ...	288	Frying-pan road ...	351
Forcada point ...	238, 240, 248	Fuente point... ..	313
— islet ...	248	Fuenterrabia bay ...	143
Forcado rock... ..	322	— anchorage ...	145
Forest, baie de la ...	61	— aspect ...	144
Formozinyo peak ...	367	— depth of water... ..	144
Fornic rock ..	25	— directions ...	144
Fosse de Cap Bréton ...	131	— tides ...	145
Four bank, le ...	60	— winds ...	145
— chenal du ...	32	Fulimant shoal ...	31, 34
— currents ...	32	Furada heights ...	339
— dangers ...	32	— point... ..	243
— new channel to the ...	35	Furado monte ...	264
— plateau du ...	83	Fuzeta town ...	378
— rock, light and fog trumpet	30	— light ...	378
Fouras harbour light ...	114		
— time ball ...	114	Gabeira islet ...	260, 268
Fourchec rock ...	77	Gabeiras islets ...	271, 276
Fourches islets ...	32	— point ...	276
— plateau des ...	33	Gaët light ...	123
Foz headland ...	348	Galea castle, point ...	175
— gulf of ...	249	— light ...	176
— inlet, village ...	254	Galera point ...	154, 305, 306
— currents, fogs ...	255, 256	— bay shoal, rock	155, 397, 415
Fraile anchorage ...	193	Galernas wind ...	143
— point ...	191, 268	Galicie province ...	332
France, buoys and beacons ...	5, 6	Galisano cape, pico de, and river ...	195
— danger signals ...	4	Gamelle, la, bank ...	54
— fog signals ...	2	Ganche bank... ..	291
— lights ..	2	Ganzanilla bank ...	193
— pilot signals ...	5	Garfanta point ...	194
— storm signals ...	2	Garonne river ...	118
— tidal signals ...	4	Garrera bay ...	206
— weather signals ...	3	Gasteape bay ...	159
— west coast ...	1	Gatseau point, beacons ...	110
— principal ports	1	Gautier point ...	101
Francia passages de ...	146	Gaviera islet ...	235, 236
Francisco bay ...	309	Gavieiros islets ...	247
Franqueira mountains ...	336	Gavre pointe de, peninsula, basse de	67, 68
Frayle point ...	410		71
— rocks ...	396	General Navigation... ..	ix.-xix.
Fraylequito point ...	422	Getares bay ...	413
Freijulfe beach ...	247	Gettysburg bank ...	372
Freu de la Porta ...	322	Gibela beach ...	172
Friar point ...	411		
Fromantières rocks ...	87		
Fromantine light ...	99		

	Page		Page
Gibalta beacon	362	Gilles sur Vie harbour, St....	102
Gibraltar bay	412	Gironde river	117
----- anchorages ...415, 416, 419		----- anchorage	125
----- buoy, moorings	418	----- bore	124
----- caution	419	----- directions	127, 128
----- coal	418	----- lights... ..121-123, 128	
----- directions	420	----- pilots... ..	124
----- dockyard	418	----- tides	124
----- lights... ..	413	Gistral peak	255
----- money	419	Glennan islands	56
----- new mole	420	----- anchorage	58
----- supplies	418	----- directions... ..	59
----- tides	416, 420	----- tides	59
----- winds... ..	421	Goatlock rock	33
----- rock of	413	Goëland rock... ..	98
----- barometer	443	Goémant, la, shoal	39
----- currents... ..443-448		Golfin point	276
----- telegraph cables	418	Gorda tower	399
----- strait of, directions	435	Gordo monte	301
----- eddies... ..	445	----- point	301
----- fog	441	Gorlé-bian rock	22
----- rain	442	Gorliz point, sands	173, 174
----- tides	443-448	Gorringe bank	372
----- winds and weather	437-443	Goudron rocks	44
Gijon bay	225	Goué Vas shoal	77, 84
----- anchorage	225	Goulet de Brest	44
----- bar, beacons	228, 231	----- dangers	44
----- buoys, dangers	226	----- Fromantine	99
----- coal	228	Goulfar port light	75
----- communications	228	Goyen river	54
----- customs and quarantine	227	Gracia tower	405
----- depth of water	227	Grajuela anchorage	388
----- directions	230	Graña, la, town	278
----- dock (contemplated)	231	Grand Banc, le	125
----- docks	227	----- Barge d'Olonne light	103
----- harbour	227	----- Charpentier and light ...88, 89	
----- hospital	227	----- Chateau	32
----- landing apparatus	230	----- Coin rock	81
----- life saving apparatus		----- Gouin point	40
----- and life boat	230	----- Mont point	79
----- lights, pilots, supplies,		----- semaphore	79
----- tides	228-230	----- Vinotière rock	33
----- new mole	227	Grande Fourche	33
----- population	227	----- Sece	97
----- shipping, repairs	227	Grands Cardinaux	76
----- signals	229	Grange Farm la	103
----- town	227	Grave point light tower	122
----- trade	227	----- passe de	126
----- water	228	----- depth of water	126
Gilão river	378	Great Arando point... ..	147
Gildas point, St.	95	----- channel	10
----- monastery, St.	81	Green isle	64
		Groac'h-du shoal	25

	Page		Page
Grognon point	66	Hadid point	459
Groix, l'île de	65	——— coast	460
——— life-boat	66	Haedik island, road	78
——— lights	66	——— anchorage	81
Grongue-Gues rock, light	78	Haffet-el-Beida	450
Gross Terre point	102	Halguen point, rocks off, and beacon	84
Grouin du Cou point and light	105, 106	Haliguen port	80
——— semaphore	105	Half-tide rock	273
Grove peninsula	313, 314	Haste Afuera shoal	400
Guadalete river	391	Hassan tower	452
Guadalquiver river	385	Haut bauc du Nord light	107
——— anchorage	388	Haut fond d'Ouessant	23
——— directions	389	Hautes Pyrenees	132
——— lights	388	Havre	119
——— navigability	386	Hea bay, point	168
——— pilots	388	——— river, navigability	169
——— tides	389	Helle, chenal de la	35
Guadamia river	219	——— rock, la	35
Gaudarranque stream	416	——— plateau de la	32, 35
Guadiana river	378	Hendaye village	143
——— buoys	380	Heras las, tower	433
——— depth of water	379	Herbandière de l', point, life-boat	99
——— fog	381	——— light	99
——— lights	381	Hercules, tower of	288, 400
——— pilots	381	——— light	290
——— tides	381	Hermosa beach	426
Gualdamesi point	410	Hermino point	291
Guardia port	331	Hernio mount	155
——— light	332	Higuera (Higuer), cape, light- tower	143, 144
Gué Vas rock	78	——— shoal	299
Guecho playa de	179	——— lower	386
——— sands	180	Higuerita lights and town	380, 381
Guénéron, île de	48	Hikeric basse	84
Guepratte shoal	40	Hocico de fuera point	247
Guéra rivulet	216	Home del cape	321, 323, 330
——— town	216	Horadada islet	196
Guérande, banc de	84	Houat island and bank	77, 78
——— steeple	84	Hourtin downs	129
Guetaria bay	157	Huchet downs, beacon	131
——— anchorage	158	Huelva town, anchorage	384, 385
——— directions	158	——— buoys	385
——— light	158	——— coal	384
——— tides	158	——— communication	384
——— port, depth of water	158	——— customs and quarantine	384
Guia church, mount, hill	216, 220, 324	——— harbour works	384
——— light, chapel	354	——— hospitals	384
Guilcher rock	53	——— population	384
Guillifneec harbour, lights	55, 56	——— repairs to vessels	384
Guipúscoa province	142, 150	——— rescue station	385
Guric île	81	——— tides	385
Guriezo valley	183	——— trade	384
		Huia point	310

	Page
Ignacio point	175
Igueldo mount	151
Ile de Rê, semaphore	106
Ille canal	84
Immaculée, church of the	89
Inconnu shoal	84
Inner Serrapio	226, 227
Insua Mayor islet	270
—— islet	332
Iroise, the	36-41
—— tides	41
Iron mountains	459
Irun town	143
Isabel bank	433
Isaro islet	169
Isla point	222
Islares point and town	187
Isle, d'Jock	32
—— Ouissant	19
Iustarrri point	159
Itzarriz mount	156
 Jacentes bank	 291
Jacob's Ladder	362
Jacques, point de. St.	76
Jais-quivel, mount (Santa Barbara)	133, 143
Janda, laguna de la... ..	405
Jardinets reef	89
Jarri town	216
Jarrio-monte	247
Jaseur bank	426
Jata mount	173
Jaune basse	49
Jean de Luz, St., bay, plateau	138
—— mill, St.... ..	103
Jeremias anchorage... ..	448
—— ——— caution	449
—— ——— directions	449
Jews cliff	459
Jibel Hadid	449
—— Mousa	429
—— Sasar	451
Jibeles battery	175
Joaquina rock	203
Juan Sancho rock	227
—— de Melao shoal	233
—— Merino point	255
Jubia bay and river... ..	280
Judios bay	422

	Page
Judios islet	289
—— point	422
Julia Joza town	409
Jument reef, point	56, 63
—— rock	21, 68
Jumpers bastion	419, 420
Junto monte	353
 Kaisar-i-Hind bank	 10
Kankush point	426
Kareck-hir point	59
Karekgréis rock and buoy	58
Keller islet	22
Kerandren cove	60
Kerbel lighthouse	69
Kerdonis point	74
Kergadec beacon	55
Kergan fort	65
Kerity mole	55
Kermorvan point	31
—— fog bell... ..	31
—— light	31
Kernevel bay lights... ..	70
—— shoal	71
Keroman creek, lights	69
Kérouroc islet	28
Kerouars bank	96
Kerso bank	71
Kersos rock and beacon	62
Kervoyal point	82
—— shoal	82
Kidizient mill	48
 Laber isle and rock... ..	 48
Laberildut bay	21
Ladrona islet... ..	241
Lage rock, bay	262, 272, 297
Laze de la, point	327
Lago bay	258
—— anchorage... ..	258
Lagos bay, river, town	374, 375
—— anchorage	375
—— communication	375
—— navigability	375
—— population	375
—— tides	376
—— trade	375

	Page		Page
Lagosteira beach	304, 303	Leon isle	379
Laida point	170	— province	183
Laisuas, las, rocks	171	Leona point	429
Laja de Monelos rock	296	Lepe town	383
Lajinas shoals	277	Lequeito bay	167
Lambarde, la... ..	88	— depth of water	167
Lameda point	325	— directions	167
Lamparon rock	242	— light	167
Lampaul bai de	21	— tides	167
— anchorage	22	— town	167
— church	19	Leres river	318
— tidal basin	19	Leurvas rock... ..	21
— village	19	Leusada bay	280
Lances de Tarifa	407	Levadizo point	268
Lanchones point	428	Levante cove	429
Landerneau	41	— island	382
Landrove river, village	260	Levanter wind	440
Langosteria point	294	Leven shoal	87
Langre point	195	Leyre river	129
Lanriec	63	Lezaro monte	302
— coast... ..	63	Liencres heights, sands, town	202
Laouenou shoals	57	Lieu le, rock	32
Lapa hill	339	Lights, Adour river	133
— convent... ..	338	— Aiguillon point	106
Lara point	170	— Albufeira	377
Laredo sands, town	188, 189	— Ar-Men rock	38
— lifeboat, &c.	189	— Arosa island... ..	315
— mole, light	189	— Aveiro river (proposed)	344
Large shoal	37	— Aven river	36
Larhune mount	140	— Avilés, Castillo point	239
Lariño bay	308	— Ayamonte bar	381
Larrun mountain	144	— Baileira point	377
Lastres bay, cape	222	— Barquero	258
Lata cape	201	— Bayona islands	329
Lavandeiras bay	261	— Bac-ar-Vechen	64
Lavardin, plateau du	111	— Bec de l'Espois	98
Laye rock	48	— Belem (Lisbon)	360
Leça river, town	337	— Belle isle	74
Lédénès de Quéménès islet	26	— Bilbao bay	176
Lée rock	270	— Blaye	123
Légounec rock	22	— Boeiro rocks (proposed)	323
Leixões rocks... ..	337	— Bonanza	388
— artificial harbour	337, 340	— Boneira bank (intended)	323
— tides... ..	337	— Brest	43
Léidé point	50	— Breton cape, port	131
Leiria woods	348	— Brivet	94
Leiras point	282	— Buarcos, leading	347
Leixon de Nordeste rock	255	— Bugio fort (Lisbon)	359
— du Vendabal rocks	257	— Burling island	351
— rocks	309	— Busto cape... ..	245
Lens point	308	— Cabanas fort, Sul bay	350
Leon	337	— Cacilhas point (Lisbon)	360
— bank	400	— Cadiz	393

	Page
Lights, Calonge	123
—— Capitania	199
—— Capucins point	37
—— Carnero point	411
—— Carvoeiro cape	350
—— Casa Blanca	454
—— Castro Urdiales	185
—— Cavado river	336
—— Cedeira port	273
—— Ceuta	434
—— bay, artificial harbour	433
—— Charente river	114
—— Chassiron point	110
—— Chauveau point	107
—— Chay tower	122
—— Chateau port	111
—— Chipiona	388
—— Cies islands	329
—— Combrit point (Odet) ...	61
—— Commercial port (Brest) ...	43
—— Concarneau	62
—— Conquet port	31
—— Contis sand hill	131
—— Coq point (Odet)	60
—— Corbeau point	100
—— Corcubion bay	307
—— Corsept	94
—— Coduan rocks	121
—— Corrobedo cape	313
—— Corsen point... ..	30
—— Coruña	290
—— Coubre point	121
—— Crac'h river	80
—— Creach point (Ushant) ...	20
—— Croix fort	62
—— Croix de la, fort	66
—— Cudillero port	243
—— Dar el Beïda... ..	454
—— Dames point... ..	98
—— Espichel cape	363
—— Espiritu point	388
—— Estaca point	267
—— Etel river	73
—— Europa point	413
—— Falaise	121
—— Felgueiras mole	339
—— Ferret cape	129
—— Ferrol	282
—— Finnisterre cape	303
—— Four rock	30
—— Fouras	114
—— Fromantine	99
—— Fuzeta	378

	Page
Lights, Gaet	123
—— Gibraltar	413
—— Gijon	228
—— Gironde river	122, 123, 128
—— Gironde river entrance ...	121, 122
—— Goulfar	75
—— Grand Banc, light-vessel ...	121
—— Grande Barge d'Olonne ...	103
—— Grave point	122
—— Grongue-Gues rook (Grands Cardinaux)	78
—— Guadiana river	381
—— Guardia, port la (proposed)	332
—— Guetaria bay	158
—— Guia	354
—— la	329
—— Haut-banc du Nord	107
—— Higuera (Higuer), cape ...	144
—— Higuerita bar	381
—— Hourtin downs	129
—— Ile aux Poulains	75
—— d'Aix	111
—— de Groix... ..	66
—— d'Oleron... ..	110
—— de Rè	106
—— de Sein	38
—— de Yeu	100
—— Insua island... ..	332
—— Isle aux Moutons	58
—— Kerdonis point	75
—— Kermorvan point	31
—— Kernevel bay	70
—— Keroman creek	69
—— L'Herbaudière	99
—— La Croix beacon	99
—— La Flotte	107
—— La Rochelle	114
—— La Turballe	85
—— La Vielle	37
—— Lanriec	63
—— Laredo mole... ..	189
—— Las Puercas	393
—— Lavardin beacon	111
—— Le Croisic	86
—— Le Grand Charpentier ...	89
—— Le Palais	75
—— Le Turc	89
—— Les Pierres Noires	31
—— Lequeito bay	167
—— Lima river	334
—— Lisbon	359
—— , leading	359
—— Llanes	216

	Page
Lights, Luarca port, la Blanca point	245
—— Machichaco cape ...	172
—— Malandar point ...	388
—— Mapon ...	123
—— Medée rock ...	63
—— Mer du Fief... ..	107
—— Millier point ...	50
—— Mino river ...	332
—— Minou point... ..	37
—— Mondego cape ...	347
—— ——— river ...	347
—— Mobihan ...	80
—— Mosqueros hill ...	434
—— Mouro islet ...	199
—— Mousset ...	123
—— Muros bay, Quijal point ...	309
—— Nervion river ...	177
—— New mole (Gibraltar) ...	413
—— Nossa Senhora da Luz ...	339
—— ——— Odet river ...	60
—— Odier river ...	385
—— Olhão (intended) ...	377
—— Ons island ...	317
—— Oporto (Douro river) ...	339
—— Outão point ...	369
—— Paimbeuf ...	94
—— Pallice ...	110
—— Palmyre point ...	122
—— Pasages ...	147
—— Patiras isle ...	123
—— Pauillac ...	123
—— Penas, cape . .	236
—— Penfeld river (Brest) ...	44
—— Penfret island lights ...	58
—— Penlan point ...	85
—— Pen Men point ...	66
—— Penmarch point light ...	55
—— Pérotine ...	111
—— Pertuis Breton ...	106
—— Piedras river ...	383
—— Pierre à l'Œil ...	94
—— Pierre Rouge ...	94
—— Pilier islet ...	97
—— Plagne ...	124
—— Plateau du Four ...	86
—— Point de l'Eve ...	93
—— Pont l'Abbé river (Loctudy) ...	60
—— Pornic ...	98
—— Port Audierne leading ...	55
—— Port Breton ...	100
—— Port Douélan ...	65
—— Port Goulfar ...	75
—— Port Guilfinéc lights ...	56

	Page
Lights, Port Haliguen ...	79
—— Ports Louis and L'Orient ...	69
—— Port Napoleon ...	43
—— Port Navalo... ..	80
—— Port St. George ...	122
—— Portzic point ...	57
—— Poulenguen jetty ...	89
—— Povoa de Varzim ...	336
—— Prior, cape ...	276
—— Prioriño chicho, cape ...	277
—— Puerto point ...	198
—— Ragged staff (Gibraltar) ...	413
—— Raoulic point, port Audierne	54
—— Richard ...	122
—— Rivadeo inlet ...	252
—— Rivadesella ...	220
—— Roca cape ...	354
—— Roche Bonne ...	117
—— Rosmeur mole ...	49
—— Rota ...	394
—— Royan ...	122
—— Rua island... ..	315
—— Sables d'Olonne ...	104
—— St. Gilles-sur-Vie ...	102
—— St. Jean de Luz ...	139
—— St. Julian fort (Lisbon) ...	359
—— St. Lambert... ..	123
—— St. Martin ...	107
—— St. Mary ...	378
—— St. Mathieu ...	31
—— St. Mean ...	94
—— St. Nazaire ...	93
—— St. Nicolas ...	122
—— St. Vincent, cape ...	373
—— Salvora island ...	313
—— San Ciprian port ...	257
—— San Emeterio point ...	214
—— San Lucar de Barrameda ...	388
—— San Martin de la Arena ...	205
—— San Sebastian ...	152, 393
—— San Vincent de la Barquera	212
—— Santa Catherina fort ...	347
—— Santa Maria... ..	394
—— Santa Martha (Cascaes) ...	355
—— Santander ...	198
—— Santo Antonio point ...	349
—— Santoña ...	190
—— Sauzon ...	75
—— Setubal ...	369
—— Seudre river... ..	116
—— Silleiro cape... ..	329
—— Sillon jetty ...	47
—— Sines cape ...	371

	Page		Page
Lights, Sisargas islands ...	296	Lisbon lazaretto ...	356
—— Socoa ...	139	—— lights ...	359
—— Spartel, cape ...	422	—— marine observatory ...	357
—— Stiff point (Ushant) ...	20	—— mooring buoys ...	362
—— Sumaya inlet ...	160	—— naval school... ..	357
—— Tagus river ...	359	—— packet stairs ...	360, 364
—— Tallais ...	122	—— population ...	356
—— Tangier ...	424	—— quay ...	355
—— Tapia islet, cape San		—— repair of vessels ...	356
Sebastian ...	249	—— royal astro. observatory ...	357
—— Tarifa ...	409	—— supplies ...	356
—— Tazones bay ...	223	—— time ball ...	357
—— Teignouse rock ...	73	—— telegraph cables ...	358
—— Tevennec island ...	37	—— trade ...	356
—— Tina Mayor ...	214	—— water ...	356
—— Toriñano ...	301	Little Arando point... ..	145
—— Toulanguet point ...	37	Little sole bank ...	9
—— Tour d'Aiguillon ...	98	Lladrona rocks ...	242
—— Tour de By ...	123	Llampera, puerto del ...	238
—— Tour du Commerce... ..	93	—— point ...	238
—— Trafalgar, cape ...	403	Llanes port ..	215
—— Tréhic ...	86	—— aspect ...	216
—— Trehiguier ...	85	—— directions ...	215
—— Tristan island ...	49	—— light ...	216
—— Terre Nègre ...	121	—— life-saving apparatus ...	216
—— Ushant ...	20	Llumeres bay and point ...	233
—— Verde islet ...	413	Lobeira grand islet ...	306
—— Vigo ...	329	—— chica islet ...	307
—— Villagarcia ...	315	Lobeiras bank ...	320
—— Villano, cape ...	298	Lobos, las, rock ...	170
—— Villes-es-Martin point ...	93	Loc'h island ...	56
Lignes de Kélerenn ...	40	—— factory... ..	56
Lima river ...	333	Lochrist church ...	25, 28, 40
—— anchorage ...	335	Locrenan mount ...	57
—— depth of water ...	334	Loctudy ...	59
—— directions ...	334	Loc Maria church ...	77
—— lights ...	334	Loédoc islet ...	23
—— semaphore ...	334	Loira sand ...	274
Limo point, Alto del ...	249	—— mount ...	319
Limpas channel, town ...	190	—— point ...	319
Linera point ...	212	Loire river ...	89
Linnen rock ...	61	Loix point ...	108
Lisbon ...	355	Lomariaker church and shoal ...	79
—— climate ...	356	Lombarde, bank, la ...	88
—— coal ...	356	Longa islet ...	270
—— communication ...	356	Longas rocks... ..	253
—— custom house ...	355	Longe bank ...	111
—— customs and quarantine ...	356	Longue Folle reef ...	88
—— docks... ..	357	Loquejon reef ...	34
—— Folha official ...	357	Lorenzo cape... ..	225
—— freshes ...	360	Lormont ...	120
—— harbour works ...	357	Los Bois de Gures, rocks ...	306
—— hospitals ...	357	Louédégues rocks ...	25

	Page		Page
Loulé fort	377	Manche suburb	76
Louis and L'Orient port	67	Mandéo river... ..	288
— directions	70	Mansuriya town	453
— docks	68	Mansle	113
— lights	69	Manuela islet	215
— navigability	68	Mapon light-vessel	123
— tides	70	Mar cape	218
Lourinha town	352	Marabut mountain	430
Louro monte	308	Marberia island	268
Louve, la	30	Marc point, St.	109
Louzaouennou rock	39	Marchan, mesa de	423
Lozano islet	244	Marguerites, les, rocks	102
Luaña bank	202	Maria Loc, semaphore	72
Luanco port	233	Marie Bernetania house	141
Luarca port	245	Marijato bar	382
— depth of water	245	Marin town	318
— directions	245	Marinulos point	318
— light	245	Marmande town	119
— tides	245	Marobiño islet	285
Lucero mount	174	Marocco	450, 459
— point	174, 182	Marola islet	285
Lue-vras rocks	62, 63	Marosa ledge... ..	312
Lugo province	251	Marrajos shoal	401
Luis fort	392	Marron village, stream	190
Luyando bank	407	Marrucco hill	398, 399
Luz chapel, bridge of	222, 339	Marseilles	119
Luzuero mount	174	Marsouin rock	98
Lytiroy islet	25	Martin town, St.	106
		Martinacosulua point	155
		Martinhal bay	374
		Martroger rock	97
		— beacon	97
Macaas	353	Martyr's hill, bank	399
Maceira river	353	Marzan points	205, 254
Machichaco bay	172	Mascatino rock	314
— anchorage	172	Masclougréiz shoal	52
— cape and light	171, 172	Masma, gulf	250
— dangers	172	— river... ..	254
— depth of water	172	Massa tower	453
Madraga bay	431	Matagorda fort	392
Mafra palace	353	Mathieu, St., point	29, 30
Magoéro rocks	71	— light	31
Magor point	316, 317	— semaphore	30
Mairruarri islet	157	Matozinhos, town	337
Major island	386	Mats, les, rock	61
Mala point	416, 419	— plateau des	82
Malabata point	423, 425	Matte du Gros-terrier	127
Malandar point	386	Maumusson, pertuis de	116
— light	388	Mauron islet, rocks off	286
Malata bay	280	Maupaise shoal	125
Malcobre beach	157	— Temps channel	55
Malla-Arria point and rocks	157	Mayenne	84
Malpica, Atalaya de and port	295	Mayor cape	195
Mámora, old	451		

	Page		Page
Mayor light-tower	198	Men Toul rock	72
—— island... ..	295	Mendeja houses	166
—— light	296	Mendizorroz mount	155
Mayorga village	416	Mendo river	288
—— anchorage... ..	416	Mendufa-bian rock	39
—— water and supplies	416	Ménéhom bank	47
Mayores bank	296	Mengam rock	44
Mayronnes	119	Menguella bank	317
Maza bridge	210	Menor cape	196
Mazighan cape	455	Mentaron point	268
—— directions	456	Mera point	289
—— shoal	456	Merana shoal... ..	193
—— communication	457	Mer du Fief	107
—— landing	456	Merejo bay, point	298, 299
—— population	456	Merendálvarez reefs	236
—— quarantine	457	Meron bay	224
—— supplies	456	—— sand	210
—— town	456	Mertola town	379
—— trade	456	Meryen port	64
Mazo fort	189	Merzan, St., fort	40
Méaban isle	81	Mesa de Marchan	423
Mean reef	309	—— Noja point	194
Meca cove	404	Meseta de Cortiguera	205
—— shoal	403	Mexilhoeira town... ..	375
Medée rock light	63	Michel, St., isle	68
Medina mountain	390, 398	Midi, Canal du	2, 118
Medina Sidonia	391	Miel river	414
—— church	398	Millier point, light	50
Medio Mar rocks	273	Milnarzos rocks	307
Médoc fort	118	Miño river	332
Mchediya town	451	—— navigability	332
—— anchorage	451	Minor island	386
—— coast	452	Minou point and light	37
Meixidos shoal	309	Mioño point, port, and village	185, 186
Meixon rock	272	Mirá, river	371
—— de Juanbou shoal	300	—— lagoon and town	345
Melides river... ..	370	Mirador point	416
Melita rock	430	Miradorio point	207
Melgorne point	29	Mirall, sierra de	150
Meluzo river	315	Miranda bank, islets, and point	285
Men an Tréas shoal	64	Mirancita islet	285
—— ar-Blanc rocks... ..	22	Mirante of Caxias	361
—— Bret rocks	59	Misiera point... ..	222
—— Civien rock	29	Mocoa point	166
—— Corn rocks	22	Mogador	460
—— Cos rock	48	—— harbour	462
—— Cren rock	62, 63	—— anchorage	462, 463
—— Du rock... ..	57, 58	—— caution	463
—— er Broc rock	81	—— directions, north	
—— Fall shoal	63	and south en-	
—— Men-Goë rock	56	trances	462, 463
—— Talec rock and beacon	55	—— tides	464
—— Tensel rock	23	—— island	462

	Page		Page
Mogador landing	461	Montares, monte	243
—— leading mark	462	Monte-gordo point	319
—— road, caution	464	Monte Ventoso signal station	277
—— current	464	Monteseco bank	317
—— town	460	Montignac	113
—— climate	464	Montijo point	387
—— coals... ..	461	Morás cape	259
—— communication	462	Morbihan	76
—— customs and quaran-		—— depth of water	81
tine	461	—— pilots	86
—— diseases	464	Morées rocks	89
—— population	460	Morgol isle	25
—— repairs	461	Moria point	209
—— supplies	461	Moriz, arenal de	222
—— soundings	460	Moro reef, rock	209, 241
—— trade	461	—— Cabeza del	389
—— water	461	Morro point	385
—— winds, weather	464	Mosqueros hill and light ...	433, 434
Mogoño bay	183	Mota castle	148
Mogote shoal... ..	401	Motrico port	161
Mogro river	202	—— depth of water	162
—— islet	197	—— tides... ..	162
Moguer town... ..	383	—— town... ..	162
Moiños point... ..	267	Mouliguet rock '	24
Mojon peak	216	Moullo anchorage	129
Molar rock, la	209	Moura, la, rock	244
Molène, barracks, island, signal staff		Mourisca point and sands ...	319
	24, 26, 27	Mouro islet	197
—— church	27, 35	—— light	199
—— pier	27	Mouron rock	291
—— pilot and rescue station	27	Mousset light	123
Mollada village	214	Mousterlin point	61
Mompas point	150	Moutons, Ile aux and light	58
Monastery road	351	Muela rock	281
Monchique, serra de... ..	371	Mugardos town	280
Moncao town	332	Mugeres point	246
Mondaca	170	Mugia town	299
—— depth of water	170	Mule, port de la	99
—— harbour	170	Muniz ledge	302
—— river	170	Murcia	386
—— tides	171	Muros bay, town	309, 310
Mondego cape	346	—— depth of water	309
—— anchorage	348	—— directions	311
—— lights	347	—— pilots	311
—— river	347	—— village... ..	242
Mondigo monte	252	—— village... ..	116
Monelos, Laja de and river	291	Mus de Loup pointe	183
Moniello bay... ..	233	Musguiz point	182
Monista islet... ..	236	—— village	
Monrevel shoal	125		
Mons Calpe	417		344
Montalvo, monte	317	Nabas point	168
Montaño peak	175	Nachitúa point	296
		Nariga point	

	Page		Page
Nantes	90	Nicholas, St., point	66
— canal	90	Nicolas, St., light-tower	122
— coal	91	— rock	127
— communication	90	Niembro inlet, village	216, 217
— customs and quarantine	90	— depth of water	217
— docks	91	— tides.	217
— navigability... ..	91	Nieto rock	272
— repair of machinery	90	Nieves mount	189
— sailors' home	90	Ninkinou shoal	53
— ship building	90	Nipple mount	421
— steam factory	90	Nive river	132
— supplies	90	Nivelle river... ..	139
— trade	90	Nogales anchorage and valley	175
Napoleon port	43	Noirie	89
— fort	189	Noirmoutier, Ile de... ..	99
Naranjo de Bulnes mount... ..	184, 216	Nois point, village	255
Narvata point	234	Noja bay	194
— field... ..	236	Nord, chenel de	87
Nasa cape	304	— passe du	125
Navalo point and port	80	— depth of water	125
— light	80	Normand le, rock	30
— tides	80	Noro islet	312
Návia river	247	Noroeste rock	237
Navigation, general	ix-xix.	North cape Blanco	457
Nau rock	350, 363	— chanhel	87
Nazaire, St.	91	Nossa Senhora da Luz lighthouse... ..	339
Nazareth church	343	Notre Dame bank	96
Needles rocks	422	— de Roch Madou	46
Negra point	206	— de Monts, village	100
Negro cape, river	238, 245	Nouch shoal	104
Negros rocks... ..	244	Noura shoal	104
Neiva river	335	Noveillard point	98
Nemíña point	301	Novias, las, rocks	314
Nervion river	176	Noya inlet, town	310
— buoys	177	— depth of water	311
— caution	179	Nuestra Señora del Socorro hermi- tage	182
— depth of water	177	— de la Luz, Sierra de	407
— directions	180-182	— del Mar	201
— freshes	179	— de las Nieves	189
— lights... ..	177	— de las Remidios church	207
— pilots... ..	179	Nueva river	218
— regulations for en- tering	182	Nuevo bridge	210
— signals	180		
— tides	179		
— telegraph cables	179		
Nespral peak... ..	189		
Netos islets	259		
Neutral ground	417		
New Castile	378		
— channel... ..	35		
— Marmora	451		
— Mole (Gibraltar)	420		
		Obidos lake	348, 349
		Odemira town	371
		Odescixe river	372
		Odet river	60
		— depth of water	60

	Page		Page
Odet lights	60	Orient harbour, L', tides ...	70
— semaphore	61	— — — — — time ball ...	69
Odiel river	383	Oriñon river, point, inlet, village ...	188
— — — — — depth of water ...	383	Orjal islet	255
Ogoño anchorage, cape, and mount	169, 170	Orleans	89
Oguella bay	168	Ormenza point	173
Oidos point	302	Ornellas peak	343
Oitavos semaphore	354	Oro tower	385
Olabeaga town	179	— river	254
Old Woman rock	50	Orrio bay	156
— Marmora	451	— islet	231
— Rocky Shoal	451	— — — — — river	156
Olearzu, mount	144	— — — — — bar	156
Oleron, Ile d'... ..	110	— — — — — depth of water... ..	156
Olga Mourina headland	248	— — — — — pilots	156
Olhão town	377	— — — — — tides	156
— — — — — lights (intended) ...	377	— — — — — de Tapia islet... ..	249
— — — — — pilot and life-boat station ...	377	Orruaga bay	159
Olives bank	126	Ortegal cape	270
Olivo point	224	Ortiguera town	247, 269
Olla shoal	396	Orulluda point	331
Ondárrua bay, town	162, 163	Orzan bay	294
— — — — — depth of water ...	163	Osa rock and beacon	215, 226
— — — — — tides... ..	163	— la, rock and beacon	240
Ons island	316	Osas point, islets	321
— — — — — light	317	Ostras river	427
Onton bay, river	183	Oteiro bay	246
Onza island	317	Otoyo mount	167
Oporto, city of	338	Ouessant, Ile d'	19
Oporto coal	338	Outão point light-tower	369
— — — — — hospital and dispensary ...	338	Outer Serrapio reef	226
— — — — — supplies	338	Oviedo province	251
— — — — — water... ..	338	Oya town	331
Orcado de Cuebas islet	219	Oyhambre cape	209
Ordaburo, mount	148, 154		
Oreoso bay	285		
Orestes rock	336	Pacegueiro islet	371
Orgullo mount	150	Packet stairs	364, 366
Oriceira point	318	Paco d'Arcos, bay and tides ...	365
Orient harbour, L'	68	Padre Santo canal point and	
— — — — — church tower ...	66	lights	383, 385
— — — — — coal	69	Paella point	287
— — — — — commerce	67	Paimbœuf light	94
— — — — — communication ...	67	— — — — — dock	91
— — — — — customs and quar-		Pain chateau point	87
— — — — — antine	67	Paix rock, la	71
— — — — — directions	70	Palais town, harbour	73
— — — — — docks	68	— — — — — dock	74
— — — — — hospital... ..	68	— — — — —	197
— — — — — lights	69	Palencia	109
— — — — — navigability	68	Pallice La, harbour... ..	110
— — — — — population	68	— — — — — coal	109
— — — — — sailors' home	68	— — — — — docks... ..	110
		— — — — — lights... ..	110

	Page		Page
Palloza cigar manufactory ...	290	Patiras isle, light ...	123
Palma castle ...	282	Patria hills ...	405
— shoal ...	282, 397	Patrocínio, playa de... ..	263
Palmella castle, mountain, town ...	367	Pauillac town, light ...	118, 123
Palmones river ...	416	— tides ...	124
Palmyre, pointe de la, light-tower	121	Pearl rock ...	409, 411
Palo de Pó islet ...	216	Pechon point... ..	213
Palo Verde islet ...	220	Pederneira bay ...	343
Paloma point ...	406	Pedregal cape ...	235
Palomas island ...	411	Pedregosa isle ...	315
Palos town ...	383	Pedrido reef ...	293
Pan de Centeno rock ...	317	Pedro bay ...	225
Pancha islet and light ...	250, 252	— de Pontel rocks ...	335
Panchorro rock ...	250	Pego rock ...	294
Pantin bay and village ...	274	Péien rock ...	39, 40
— point ...	272	Pellereso point ...	212
Pantorgas islets ...	249	Pen-an-Guern rock ...	61
Papa, silla del ...	406	Pen-ar-land mill ...	24
Papabreas rock ...	281	Pen Men rock ...	72
Paps the, hills ...	361	Peña de las Animas... ..	291
Parquete shoal, la ...	39	— Boa monte ...	294
Parsons bank ...	9, 10	— point ...	294
Pas river ...	202	— Castillo peak, hill ...	196, 200, 202
Pasada point ...	250	— Cascada point ...	286
Pasages port ...	145	— convent ...	353
— anchorage... ..	146	— Mayor point, islet ...	162, 210
— coal ...	148	— Menor islet ...	210
— communication ...	146	— Rubio point ...	225
— customs and quarantine... ..	146	— Santa mount ...	221
— depth of water ...	150	— Ana rock ...	185
— directions ...	148	— point ...	409
— foundry ...	146	Peñas cape, light ...	235, 236
— harbour works ...	146	— caution ...	235
— hospital ...	146	— current ...	237
— life-boat ...	148	— directions ...	237
— lights ...	147	— winds ...	237
— navigability ...	142	Pendueles point ...	215
— pilots ...	148	Penerf port, beacons, village ...	82
— population ...	146	— depth of water ...	82
— provisions ...	146	Penieron rock ...	299
— signals ...	147	Penfeld river, light... ..	41, 44
— tides ...	148	Penfret island ...	56
— trade ...	146	— light... ..	56, 58
Pasiega island ...	203	Pen-hir bay ...	47
Pas-age point ...	189-193	— point ...	40, 47
— du Fromveur ...	23	Peniche peninsula ...	349
Passages, England to Gibraltar ...	15-18	— anchorage ...	350
— Gibraltar to England ...	16, 18	— caution ...	351
Passe du Sud... ..	117, 126	— light ...	350
— depth of water ...	126	— semaphore ...	350
— du Nord ...	125	— telegraph cable station ...	350
— depth of water ...	126	— tides... ..	351
Pâté fort ...	118	Peninha convent ...	353

	Page		Page
Penlan point	85	Peton de Socabo shoal	302
Penmane anchorage	70	Petonciño rock	302
Penmarch point, rocks	53-55	Peyes islet	217
—— light	55	Peyrière la, hill	69
—— tides	55	—— lighthouse	69-71
Pen-men point, light	66	Phare bank	403
Penote height	223	Phesants isle	143
Penthièvre fort	72	Philibert church, St.	56, 57
Penvins point	82	Phillip point	393
Pequechillá rock	150	Phoenix bank	427
Pera town	376	Picacho de Barbate	404
Peral channel	211	—— point	385
—— monte	236	Pico de la Cabada, hill	198
Peran point	231	—— del Medio	222
Percebera rock	206	—— de Mogro	203
Perceheiras islets	371	—— de Sueve	221
Perdrix la, rock	59	Picos point	332
Peregril island, rock	428, 429	Picota peak	373
Pereiro rock	281	Pié islet	256
Péres rocks	96	Piedade point	374
Peril rocks	426	Piedora point	223
Pero Dente bank	294	Piedra Alzada island	157
Pérotine light	111	—— Baíña shoal	325
Perret bank	94	—— de Burela rock	255
Perro rocks, light	388	—— Blanca point	160
Pertuis d'Antioche	111	—— Blancas point	319
—— Breton	107	—— Brasileiro buoy	324
—— anchorage	108	—— shoal	324, 328
—— directions	108	—— Mea rocks	267
—— de Maumusson	116	—— de Pego	324
—— depth of water	116	—— Do Porto shoal	288
—— point	116	—— del Piloto rock	175
Peruda (Santa Barbara)	138	—— point	160
Pescadeira suburb	289	—— Rubia point	320
Pescador point, light-tower	190	—— Salaino	323
Pesquera point	319	—— buoy	323
Pesqueresse rock beacon	71	—— Verde	408
Pesquiera point	370	Piedras river	382
Pesús village	213	Pierre á l'Œil light	94
Petit Barge d'Olonne	103	—— St., banc de, church	44, 55
—— Charpentier	88	—— des Poissons	28
—— Courleau	36	—— du chenal	96
—— Leac'h passage	40	—— Moine rock	96
—— Mont point	79	—— Percée islet	87
—— Pauceau	36	—— buoy	87
—— Sécé	97	—— Rouge light	94
—— Taureau	28	—— St., town	106
Peton rock	272	Pierres Noires rocks	27, 72
—— de Entrellusa rock	232	—— light-tower	31
—— de Fero rock	307	—— Vertes, rock	24
—— de Mañoto	302	Pigeon point, island	411, 422
—— de Potes rock	307	Pignons de Kéravel	39
		Pilior islet, light	97

	Page		Page
Pilier islet semaphore	97	Pont d'Yeu	100
Pilours island	102	Ponta da Insua	363
Pimiango village	212	Ponte d'Argés	362
Pindo village	305	Pontchou bank	41
—— mount	305	Pontel pedra do, rocks	335
Piñeira point... ..	254	Pontevedra bay	317
Piñeiro point... ..	305	———— anchorage	320
Piriac, plateau de	83	———— dangers	318
Pistaña point	218	———— directions	320
Pitorro bank	191	———— pilot	320
Placer Nuevo	407	———— town	319
—— del Oeste bank	408	———— communication	319
—— Puerco	408	———— customs and quar-	
Placeres point	318	antine	319
Plaeen ar Beniguet rocks	28	———— depth of water	318
Plagne harbour, light	124	———— harbour works	319
Plaine la, church	96	———— hospital	319
Plancha rock... ..	222	———— population	319
—— point	310	———— trade	319
Plass ou Normand	51	Pó bay	216
Plata cape sierra de... ..	405	Pope's chair	405
—— C.G. station	405	Pourceaux bank	57, 59
—— la cape... ..	145	Porcegosas rocks	249
—— light	147	Porcia bay	248
Plate rock, la... ..	50	—— Atalaya de	248
Plateau du Four, buoys	83, 84	Pornic port	95
Platin shoal	127	———— light	98
Platresses bank, les	32	Port Blanc	74
Playa de Arneles	321	—— Navallo, pointe de	79
—— de Berria	194	—— de Brigneau	64
—— del Patrocinio	203	Portelas islets	254
—— de Saraus	158	Porto covo, light	361
Plencia, Rio de	174	Porto-novo	353
—— depth of water	174	—— bay	275
Plomb point	109	—— point	318
Plouaré church	49	Portocelo river	259
Plouarzel church	32	Port Haliguen jetty light	79
Plougof church	53	Portiño bay	258
Pointe de chef de Baie	109	Portivi mill	73
—— Grave buoy	126	Portsay point	95
—— Penzers	33	Portapaul village	19
—— la, fort	113	Portuandi	166
Poissons, pierre des	28	Portuchiqui loading place	166
Polains	58	Portugal, coast of	7
Polveira beach	310	—— current	13
Polvaro tower	415	—— meteorological signals	7
Polvorin	200	—— principal ports	7
Pomarão village	379	—— railways	7
Pombeira rock	363	—— telegraphs	7
Pont l'Abbe river and light	59, 60	—— south coast of, general	
—— des Chats	51	remarks	374
—— de Sein	51	—— gales	374
—— Scorff river	67	Portugalete town	177, 180

	Page		Page
Portugalete church...	180, 182	Puerto Comillas ...	207
——— life-boat ...	179	——— Real town ...	392
Portuguese entrance ...	332	——— buoy ...	325
Portus cale ..	339	——— church...	397
Portz-carn ...	54	——— del Vale bay...	264
Portz-guen bay ...	73	——— de Vicedo ...	264
Portzic point, light ...	37	Pulgeiro shoal ...	288
Portzmoguer beach ...	34	Punta da Papõa ...	350
Potee de Beurre rock ...	71	——— Rodeira shoal ...	324
Potence light ...	105	——— Subrido buoy ...	328
Potorroarri point ...	172	Puntal bay ...	323
Poulains isle, light ...	74, 75	Puntales castle ...	390, 395, 398
——— les, reef ...	74	Punxallo rock ...	272
Pouldavid river ...	49	Puron bay ...	215
Pouldu bay ...	65	Pyrenees ...	132, 138, 183
Poulhaut windmill ...	88		
Pouliguen port, light ...	87, 89		
Pourceau Petit rock ...	36	Quarteira river ...	376
Povoa de Varzim light ...	336	Quebrantas shoal ...	299
Pozo anchorage ...	388	——— great ...	299
Pradeiras point ...	291	——— small ...	299
Prado point ...	254	——— banco de las ...	198
Prados point ...	274	Quebrantes beach ...	241
Pragrina ledge ...	312	Queijal light ...	309
Praia formosa beach ...	553	——— point... ..	308
Právia river ...	242	Queijo fort ...	337, 339
——— bar ...	242	Queimada islet ...	261
——— directions ...	242	Quexo cape ...	194, 195
——— supplies ...	242	Quéménès island ...	26
——— tides ...	242	Quernica town ...	171
Préoire rocks and beacon ...	98	Quiberon bay... ..	76
Pres-qu' ile de Kélermn ...	36	——— anchorage ...	76
——— Quiberon ...	71	——— directions ...	80
Preveso point ...	255	——— peninsula ...	72
Prieto cape ...	217	Quiebra island ...	310
——— dangers ...	217	Quilmas village ...	305
Principe fort... ..	305	Quimperlé river ...	65
Prior cape ...	275	——— town ...	65
——— currents... ..	276	Quimper river ...	60
——— light ...	276	——— communication ...	60
Prioriño cape, grande, and light ...	277	——— depth of water ...	60
Prioriño cape, chico... ..	277	——— town, trade ...	56
Privas ...	89	Quinta Nova ...	354
Profonde pierre la, rock ...	48	Quintres cape ...	194
Promontorio point ...	196, 254		
Puebla bay ...	315		
Puente del Puerto river ...	299		
Puentedeume town ...	287	Rabanal point ...	185, 187
Puercas rocks ...	396	Rabât town ...	452
——— beacon ...	396	——— anchorage ...	453
Puerco River, tower ...	401, 407	——— coast ...	453
Puerto point ...	196	——— communication ...	452
——— light-tower ...	198	——— fever lague ...	452

	Page
Rabât landing	453
—— population	452
—— supplies	452
—— tides	453
—— trade	452
Râbia bay, inlet	209
—— sand, islet	208, 209
Rabida, monte da	339
Rabion islet, point	243, 244
Rabiosa point	199
Rabo del Cabo	211
Rada stream	190
Rade de la Pallice	109
Raguen rock	55
Raguénès islet	64
Rana point, church	354, 364
Rance canal	84
Ranvel rocks	28
Raoulie point	54
—— light	54
Raposa cove	198
Raso point, plain	286
Rastrillar point	189
Ratin point	238
Raven mount	449
—— rock	335
Rayo point	241
Raz point du,	50
—— life-boat	38
—— de Sein	52
Razo cape	354
—— point	295
Rè, Ile de	106
—— dangers	106
—— docks	106
—— lights	106
Real, puerto	392
Reboira bay	259
Recherche, plateau de la	79
Recouvrance suburb	41
Redes anchorage, bay, castle, and point	287
—— bay, depth of water	287
Redon town	85
—— dock	85
Redonda point	281
—— rock	191, 192
Redondela river	324
Regla convent	386
Reina cove	429
Remedios point	207, 305, 307
—— church	207
Romela reef	352

	Page
Renards rocks and shoal	30
Rennel current	13
Rennes town... ..	84
—— communication	84
—— population	84
Repentie point	109
Requejada village	204
Requexo point	239
Restinga de Laxe reef	336
Retin mount	405
Revallera point and light	243
Rey cove	429
Rhu, port	49
Ria point	321
Riberen fort	77
Riceta shoal	387
Richard light	122
Rinchador ledge	312
Rinconcillo point	416
Rio Tinto, depth of water	384
Rivadeo inlet... ..	250
—— climate	251
—— coal	252
—— communication	251
—— customs and quaran- tine... ..	251
—— depth of water	251
—— directions	252
—— docks	251
—— harbour works	252
—— hospitals and homes	251
—— life-saving apparatus	252
—— light	252
—— pilots	252
—— population	251
—— repair of vessels	251
—— supplies	252
—— tides	252
—— town	251
—— trade	251
Rivadesella harbour	219
—— depth of water	220
—— lights, tides	220
—— life-saving ap- paratus	220
Riza reef	387, 389
R' Mel bay and river	428
Robaleira point and light	273
Roca cape	354
—— light	354
Rocemada rock	270
Róch Helon bank	59
Roche cape, shoal	401

	Page		Page
Roche de Sud Est	117	Ronde point	324, 327
----- Bonne. plateau de	116	Ronfle shoal buoy	87
----- light-vessel	117	Roscanvel mill	40
----- Bernard la town	85	Rosia bay	418
----- Noire, la, rock	144	Rosmeur mole	49
Rochefort town	114	----- port	48
----- coal	115	----- quay, life-boat	50
----- communication	115	Rospects rocks, les	30
----- depth of water	115	Rostolon shoal and buoy	59
----- docks, &c.	115	Rota bank, light, town	393
----- harbour works	115	Rothres shoal and tower	83
----- hospital	114	Rouleau rock... ..	78
----- population	115	Rousse bank, la	60, 61
----- ship building	115	Roux rock	27
----- supplies	115	Royale shoal	37
----- tides	116	Royan light-tower	118, 122
----- time ball	116	----- gridiron	120
----- trade	115	Rua island light	315
Rochelle, la	112	Ruballo alto de, hill	198
----- coal	113	Rubia point	249
----- communication	112	Ruiloba point	207
----- customs and quarantine	112	----- town... ..	207
----- docks	113	Rumeles point	249
----- hospital	112	Runiou beacon	24
----- lights	113	----- point	21
----- navigability	112		
----- population	112	Sabiote river	183
----- supplies	112	Sablaire la, shoal	100
----- tides	116	Sables d'Olonne port	103
----- trade	112	----- caution	105
Rocher Callet	22	----- coal	104
Rocky shoal	451	----- communication	104
Rodeira point	323	----- customs and	
----- buoy	328	----- quarantine	104
Rodeo point	413	----- dangers	104
Rodicio islet	270	----- directions	105
Rodiles point... ..	224	----- docks, &c.	104
Roheu rocks	72	----- life-boat	105
Rohellan rock	72	----- lights	104
Rolion le, rock and beacons	65	----- population	104
Romaine semaphore... ..	84	----- sailors' home	
Romanella rock	230, 236	----- and hospital	104
Romanellas point, is'ets	246	----- tides... ..	105
Rompido de Cartaya light	383	----- trade	104
Roñadoira mountain	255	Sabugo point... ..	233
Roncadoira point	252	Sada town	288
Roncadora point	312	Sado river	368
Roncosa shoal	322	Safi bay	458
Roncudo point	296	----- anchorage	459
Ronda mountain	389	----- cape	458
Rondana buoy	328	----- landing	459
----- shoal	325	----- population	458
Ronde isle	44		

	Page		Page
Safi town	458	Saint Nazaire docks	92
— trade	459	— hospital	91
Sagres bay and point ...	373, 374	— lights	93
Saja river	204	— navigability	92
Sainar point	428	— pilots	94
Saiñas point	259	— population	91
Saint Anne point	144	— port	92
— Barbe point	139	— roadstead	92
— Bartholomew church ...	153	— shipbuilding	91
— rocks	335	— tides	94
— Domingo bank	398	— trade	91
— Esprit suburb... ..	132	— water	92
— Felipe point	395	— Nicholas battery and church	101
— George bank	126	— island	56
— port, lights	122	— light-tower	118, 122
— Gildas monastery	81	— Palais, church, mill and vil-	
— point	95	lage	118
— Gilles sur vie harbour ...	102	— Paterne	76
— tides	105	— Philibert church	56, 57
— lights	102	— Pierre bank	44
— Jacques point... ..	76	— town	110
— Jean de Luz anchorage ...	141	— Sauveur church	99
— bay	138	— Sebastian fort	393
— depth of water	139	— light	393
— directions	140	— mill	40
— light	139	— Sever river	132
— tides	140	— Ubes	368
— town	139	— Vincent cape, light	373
— Julian fort and light ...	359, 361	— currents	373
— Lambert light	123	— fog	374
— Lucia	289	— semaphore	374
— Marc point	109	Saints, island, rocks, shoals ...	51
— and beacon	109	— bridge	51
— buoy	87	Saintes	113
— Martin island... ..	322	Salado river	407
— (Ile de Ré) dock, slip		Salamanca	337
and gridiron	106	Sali town	452
— town	106	Salmedina rocks	387
— lights	107	Salta Caballo point	186
— point lights	133	Saltés island	383
— Mary cape and light... ..	377, 378	Salué sand	189
— Mathieu light	31	Salvora island	312
— point	29, 30	— light	313
— semaphore	30	Samon Monte	294
— Mean lights	94	Sampayo river	324
— Merzan fort	40	San Adrian point	295
— Michel isle	68	— Amade point	285
— Nazaire	91	— Andres battery	324
— coal	92	— Antolin beach	218
— communication	91	— river	218
— customs and quaran-		— Anton island	157
tine... ..	93	— light	158
— directions	95	— Antonio del Mar beach ...	218

	Page		Page
San Antonio bay	268	San Lorenzo cape	225
— island	328, 331	— Lucar de Barrameda	387
— point lighthouse	216	— ———— communi-	
— castle	289	— ———— cation	387
— point	379	— ———— hospital	387
— chapel	273, 377	— ———— life-boat	388
— Augustin cape	246, 247	— ———— popula-	
— Bartholomew church	155	— ———— tion	388
— Bartolomeo mount	406	— ———— quaran-	
— — picacho de	406	— ———— tine	388
— Bartolomé point	295	— ———— trade	387
— Braz fort	354	— Luiz, serra de	367
— Carlos point	281	— Mamed sierra de	333
— — bank, point	191	— Martin castle	280
— castle	191, 192	— — houses	154
— suburb	392	— — point	196
— Ciprian, farollones de	256	— — de la Arena	203
— light	257	— ———— bar	204
— port	250, 257	— ———— directions	205
— — depth of water	257	— ———— lights	205
— — directions	258	— ———— pilots	205
— — tides	258	— ———— signals	205
— Clemente point	319	— ———— tides	205
— — reefs	256	— Martinho bay, town	349
— Cosme mount	207	— ———— coal	349
— Cristóbal monte	282	— ———— communication	349
— Damian castle	251	— ———— harbour	349
— Diego point	289	— ———— pilots	349
— Domingo mines	379, 380	— ———— provisions	349
— Emeterio hermitage	212	— ———— railway	349
— — light-tower	212	— ———— water	349
— Estéban village	242	— Mateo mount	406
— Felipe	390	— Miguel point	253
— castle	281	— Micolain mount	162
— pier	398	— Nicolás point	162
— Fernando suburb	302	— — islet	167
— García point, tower	413	— Ovidio hill	339
— Genjo village	318	— Pedro de Muel, chapel	348
— George bay and beach	275	— — del Mar, beach	201
— Ignacio point	175	— — bank	201
— Jacinto hermitage	344	— — church	206
— — tower	386	— — bay	232, 244
— João da Foz church	339	— — beach	285
— Jorge bay	275	— — islets	294
— Juan bay	260	— — monte	294
— — de la Peña church	173	— — passages, de	146
— — village	239	— — point	216
— Juan, passages de	146	— Philip fort	370
— — del Canal point	201	— Roque, monte de	260
— Julian fort	361	— — church	411, 419
— light	359	— — town	413
— beach	261	— Roman beach	263
— Justo shoal	226	— Sebastian bay	151

	Page
San Sebastian bay current ...	153
— directions ...	153
— lights ...	152
— pilots ...	153
— tides ...	153
— cape, light-tower ...	249
— coal ...	153
— communication ...	151
— depth of water ...	152
— hospital ...	151
— life boat, &c. ...	153
— mooring buoys ...	152
— point ...	232
— population ...	150
— quarantine ...	151
— town ...	150
— trade ...	150
— Simon islet ...	324, 328, 331
— Simonito mount ...	427
— Stephen chapel ...	231
— Telmo point ...	159, 223
— hermitage ...	159, 222
— Thiago de Cassem hill ...	370
— Thomas fort ...	363
— Valentin rock ...	174
— Vicente cape ...	372
— hermitage ...	207
— de la Barquera inlet ...	210
— depth of water ...	211
— directions ...	211
— islet ...	269
— light ...	212
— tides ...	212
— de Luano bay ...	206
Sancti Petri river ...	400
Santa point ...	265
— Ana mount, hermitage ...	243
— chapel, rock ...	149, 185
— castle ...	185
— Barbara mount (Jaisquivel) ...	138, 157
— Catalina castle ...	393, 396, 398
— fort ...	409
— hermitage ...	167
— hill ...	225, 226, 227
— light-tower ...	226, 228
— mole ...	226, 228
— de Lequeitio point ...	167
— point ...	160, 226, 433
— Catalina de Lequeitio point ...	
— light ...	167
— de Mondaca point ...	160
— Catharina fort ...	346

	Page
Santa Clara islet, light ...	153
— mount ...	159
— point ...	215
— hermitage ...	162
— Clara convent ...	336
— of Bermeo mole ...	171
— Cruz islet, fort ...	289
— chapel ...	253
— de la Mota castle ...	150
— Eugenia bay ...	315
— Gadia point ...	249
— Isabel castle ...	146
— Justa beach ...	206
— Lucia district ...	290
— sierra de ...	333
— Maria lights ...	394
— communication ...	391
— population ...	391
— rescue station ...	392
— telegraph station ...	392
— town ...	391
— trade ...	391
— del Mar bay ...	241
— Marina sand ...	219
— island ...	195
— Marta port, town ...	269
— shoal ...	325
— Martha fort ...	361
— light-tower ...	355
— Ololla, sierra de, shoal ...	232
— Rocha point ...	376
— Tecla monte ...	330, 331
Santander province ...	183
— barometer, currents, winds ...	184, 185
— port ...	195
— anchorage ...	201
— buoys ...	199
— coal ...	197
— communication ...	197
— customs and quarantine ...	197
— depth of water ...	195
— directions ...	199
— docks ...	197
— foundry, factory, stores ...	197
— harbour works ...	197
— life-saving apparatus ...	197
— lights ...	198, 199
— navigability ...	196
— pilots ...	199
— population ...	196
— sailors' home, hospital ...	197
— tides ...	199

	Page		Page
Santander town	197	Setubal port	368
——— trade	197	——— anchorage	369
——— water	197	——— bar	369
Santiago de Compostilla	313	——— building yards	369
——— fort... ..	414	——— coal	369
——— sands	159	——— communication	369
Santibañez mills	399	——— customs & quarantine	369
Santiuste bay	214	——— depth of water	368
Santo Antonio point and light	349	——— directions	370
Santoña inlet and mount	189, 190	——— home for sailors	369
——— bar	191	——— light	369
——— buoys	191	——— pilots	370
——— directions	192	——— population	369
——— tides	193	——— quay	369
——— lights	190	——— repair of vessels	369
——— pilotage	192	——— supplies	369
Santurrarán point	162	——— tides	370
Santurce village and harbour	175, 176	——— trade	369
——— rescue station	176	Seudre river	110
Sara bay, village, shoal	404-406	——— light	116
Saraus town	157	——— tides	116
Sardaño cape	372	Seville... ..	384, 386
Sardiñeiro point	304	Sèvre river	90
——— village	304	Sharf-el-Yahudi, or Jews cliff	459
Sardinero beach	200	Siboure suburb	139
Sargadelos iron works	257	Sidi Abd Allah	459
Sarrapia bank	221	——— Wasman, tomb... ..	459
Sarridal point	272	Siege rocks, la	28
Sarzeau shoal	79	Sien, chaussée de	51
Saude mountain	343	——— Ile de	51
Sausaten bay... ..	166	——— light	38
——— anchorage	166	——— life-boat	38
Sauzon port	74	——— tides	52
Seal point	85	——— Pont de	51
Secreta point... ..	411	——— Raz de... ..	52
Segaño fort and point	281	——— depth	52
Segunda island	203	Sierra Bullones	429
Seixo village... ..	280	——— river	310
——— Blanco point	289	——— shoal	232
Senora del Alba	329	——— de Cuera mountains... ..	216
Señorio rock	243	——— de Enmedio	407
Sepes, los, rocks	146	——— del Espiritu Santo	242
Serantes mount	175	——— de Jerez	335
——— bay	280	——— de Santa Ollalla	232
——— point	276	——— de Mirall	150
Serra convent	339	——— de Nuestra Señora de la Luz	407
——— de Monchique	371	Siérvana village	175
——— de San Luiz	367	Silla del Papa	405
Serrapio de Mar reef	226	——— point, lighthouse	212
——— de Tierra reef	226	Silleiro cape	323, 328
Serrido point... ..	255	——— light	329
Serron islet, bank	244	Sillon jetty, light	47
Serroux, les, rocks	26	Silves river, town	376

	Page		Page
Sinal del Maño shoal	314	Spartel bay	422
Sines cape and light	370, 371	——— coast	422, 449
—— communication	370	——— cape	421
—— point	314	——— light	422
—— population	370	——— race	422
—— trade	370	——— soundings	422
Sisargas islands	295	Spinec shoal and buoy	55
——— directions	296	Stiff, baie du	22
——— life-saving appa- ratus	296	—— point, light	20
——— light	296	Stockade light	105
Sismundi village	269	Storm signals, coast of France	28
Slà town	452	Strait of Gibraltar, winds	437
Sobrepuesta point	266	Suances islands	203
Socastro point	260	Suazo bridge	392
Socos harbour, lights	139	Subrido point	323, 331
—— fort	139	Sueve, pico de	221
—— life-boat	139	Sud-est, roche du	117
—— mole	139	Suira	460
—— fog bell... ..	139	Sul bay	350
—— signals	140	Sulzac hills, light	122
—— tidal harbour... ..	139	Sumaya (Zumaya) inlet	159
—— tides	140	—— depth of water	159
Sœur rock	77	—— landmarks	159
Sœurs, passage des	78	—— lights	160
——— depth of water	78	—— pilots	160
Soldats, les rocks	64	—— tides	160
Solita island	203	—— town	159
Sollabe mount	171	Susan rock	430
Sombriza islet	256		
Somocuebas point	202		
Somorrostro river	192		
——— depth of water... ..	193		
——— directions	183	Tagus river	358
Somos mount... ..	221	—— anchorage	358, 364, 366
—— light	220	—— bar	359
—— point	221	—— beacons	362
Somos Llungo bank... ..	230, 236	—— buoys	362
Son point, Atalaya de, town	310	—— caution	362
Sonavia point	188	—— directions	363
Sor river	264	—— leading marks	361
Soundings	9, 434	—— lights	359
—— on parallel of Chaussée de Sein	10	—— north channel	363
——— Ushant	9	—— pilots	361
——— la Chapelle bank	10	—— semaphore	360
Spain, N. and N.W. coasts	6	—— south channel	364
——— principal ports... ..	6	—— submarine telegraph	362
—— S. coast	8	—— tides	360
——— principal ports	8	Taillefer banks	74
—— telegraphs	7	Tajo tower	402
Spanish entrance	332	—— river	358
		Talayamendi hill	157
		Talayero point	160

	Page		Page
Talhadas mountain	343	Telegraphs, Bordeaux	119
Tallais bank light	122	----- Brest	42, 44
Talut point	65	----- Cadiz	391, 392, 396
Tamba island	318	----- Corcubion	305, 307
Tambre river	310	----- Coruna	289
Tangier	424	----- Ferrol	278
----- communication	424	----- Gibraltar	418
----- bay	423	----- Gijon	228
----- anchorage	425	----- Huelva	384
----- point	423	----- Lagos	375
----- tides	425	----- La Rochelle	112
----- population	424	----- Lisbon	356, 358
----- light	424	----- Louis and L'Orient	67
----- supplies	424	----- Peniche	350
----- trade	425	----- Pontevedra	319
Tanjah town	424	----- Portugal	7
Tapia islet, light-tower, village ...	249	----- Rivadeo... ..	251
Tarifa, Lances de	407	----- Sables d'Olonne	104
----- anchorage	408	----- San Lucar de Barra-	
----- caution	409	----- meda	387
----- life-saving apparatus	409	----- San Sebastian	151
----- light	409	----- Santander	197
----- peninsula	409	----- Setubal	369
----- tides	410	----- Spain	7
Taro rock	61	----- Tangier	424
Tas de Pois rocks	36	----- Tavira	378
Taume, monte	312	----- Ushant	21
Taureau rock, la	48	----- Vigo	327
Tavira town	378	----- Villa Nova de Portimão	376
----- anchorage	378	----- Villa Real	381
----- bar	378	----- Vivero	261
----- communication	378	Tenaza point	325
----- population	378	Tendoc rock	33
----- quay	378	Terre Negre light tower	121
----- repair of vessels	378	Terron bar, lights	382, 383
----- supplies	378	Testa de Castro point	260
----- trade	378	Testa de Buch village, la	129
Tazones bay	223	Tetas, las	407
----- buoy... ..	223	Tête de la Mauvaise and buoy ...	126
----- point	223	Tett	457
----- light	223	Tevenneo island and light	38, 52
Teich channel	129	Teviec Ile	72
Teignouse rock, la	72	Tharsis pier	384
----- fog bell	73	Tidal signals (French)	4
----- lighthouse	73	Tidal streams and currents, North	
----- passage	73, 76	----- Atlantic	13
Teilan rock	312	----- Blanco	
Teis bay, village	324	----- cape	458
Telegraphs, Algeciras	414	----- Biscay,	
----- Arcachon	129	----- coast of	165
----- Ayamonte	379	----- Cantin,	
----- Bayonne	133	----- cape	458
----- Bilbao	178, 179		

	Page		Page
Tidal streams and currents, Chenal		Torco de Afuera point light	... 205
du Four	32	Toriñana, cape	... 300
Foz	256	— lighthouse	... 301
Guipuscoa	142	Torre de Ceredo, mount	... 183
Iroise...	41	— islet	... 196
Mogador	464	Torre de Meca	... 402
Ortegal,		— Velha, houses of	... 366
cape	270	— Gorda	... 392
Passage		— Vista	... 400
de From-		Torrella point	274, 285
veur	24	— Serron de la	... 285
Penas		Torres cape	... 231
cape	238	Toro islet	... 215
Portugal	13	Torriente bank	... 207
Prior		Toul-ar-Ster landmark	... 55
cape	276	Toulinguet passage	... 40
Raz de		— point and light	... 37
Sein	53	— life-boat	... 38
San Se-		Tour de By, light-vessels	... 123
bastian	153	— des Bâts	... 87
Santan-		Tourmalet mountain	... 132
der	185	Trafalgar cape	... 402
Spartel		— currents	... 402
cape	422	— bank	... 403
Trafalgar		— light-tower	... 403
cape	403	Trafaria village	... 365
St. Vin-		— bank, buoy	... 365
cent, cape	443-448	Tras-os-Montes	... 337
Ushant		Traverse rock and beacon	... 82
	13, 15, 23	Travesias winds	... 238
Tierra Blanca point	... 156	Trece cape	... 298
Tina del Este	... 213	Tregune church	... 61
— Mayor	... 213	Tréhic light	... 85, 86
— depth of water	... 214	Trehiguier lights	... 85
— tides	... 214	Trépassés bay	... 50
— Menor	... 213	Trépied bank	... 64
— del Oeste	... 212, 214	— rock, le	... 39
Tinas, False	... 212	Tres Hermanos islet	... 270
Tinto river	... 383	— Irmaos point	... 375
— depth of water	... 383	Trescadec beacon	... 55
Tocha town	... 346	Trest windmills	... 79
Tolmo bay	... 410	Treto town	... 190
Tolosa	... 156	Trévignon point	... 63
Tomasa ledge	... 312	Trezien mill	... 33
Tongonas rock	... 313	Triélen island	... 26
Tonina bank	... 289	Tristan island	... 49
Tonnay Charente	... 113	— light	... 49
— gridiron	... 114	Trocadero town	392, 393
Toranda beach	... 218	Trois Pierres ledges	... 88
Toralla island	... 325	— buoy	... 70
Torbas bay	... 248	— tower	... 35
Torche bay	... 54	Trompon Mayor heights	... 171
Torco de Afuera point	... 203	— Menor heights	... 171

	Page		Page
Troves rocks	87	Val-de-Arena	302
Truie rock	89	Val-de-Vaqueros bay	406
Truies rock	68, 70	Valdes fort	172
—— bank	70	Valfermoso river	377
Tudy isle	59	Vale, puerto del	264
Turballe la	83	Valladolid	197
—— lights	85	Valliere point light	122
—— Gamelle rock	83	Vallonga fort	376
Turo bank	70	Valongo hill	353
—— ledges	88	Van, pointe du	48
—— lighthouse	89	Vandree shoal, la	39
Turdeiro rock	302	Vannes town... ..	76
Turrulla point	145	Vares bay, cape, village	264
Turret of Caxias	361	Vega, Arenal de	222
Tuta bar	382	—— island, port	246
		—— river	407
		Vejer town, mills	402, 403
		Velhas point	281
Ubes, St.	368	Vendavales winds	184, 438
Ubrique mount	390	Vendavel shoal	226
Udra cape	318	Ventosa point	263
Uguerre point	171	Ventoso hill	236
Ulibarren palace	167	—— monte	277
Ulia mount	150	Veo cape	298
Umbrera point	203	Verd rock	89
Umbria point and tower	383	Verde islet and light	413
Uniform system of buoyage	5, 6	—— river	375
Urbion sierra de	337	Verdon road	125
Urgull mount	150	Verres, les, bank	48, 60, 61
Urola river	159	—— ledges... ..	64
Urrieles de Llanes mountains	216	Verte isle	64
Urros-de Liencre rocks	202	Viacaba river	224
Urumea river	150	Vianna do Lima town	334
Ushant island	19	Viaveles port... ..	248
—— anchorages	21	—— tides	248
—— caution	14	Vicedo, puerto de	264
—— fog	20	Vicos cape	322
—— fog trumpet	21	Victoria tower	413
—— life-boat	21	Videiros points	264
—— lights	20	Vidiago point	215
—— pilots	23	Vidio cape	244
—— semaphore and tele- graphs	21	Vidrias point... ..	241
—— supplies	20	Vieille rock	48, 77, 87
—— tides	13, 15, 23	—— beacon	87
—— winds	20	—— light	38, 48
		—— Noire shoal	25
		—— rocks	23
Vaca rock	222	Vieira river	348
Valbelle shoal	32	Viernoles peak	202
		Vieux Chateau point	73
		—— Boucaut	137
		—— Moines rocks	30
		—— Soulas beacon	127

	Page		Page
Viga rock	251	Villagarcia light	315
Vigia de Ancados	314	Villa Nova de Gaya... ..	338
— point	213	— light	371
Vigo, anchorage	327	— de Portimao	376
— battery... ..	326	— communication	376
— Bayona road	326	— duty on vessels	376
— bay	323	— tides	376
— buoys	328	— trade	376
— caution... ..	329	— town	371
— citadel	326	— Real town	379
— coal	327	— coal	379
— communication	327	— communication	379
— cultivation	326	— population	379
— customs and quarantine	326	— repair of vessels	379
— depth of water	323	— supplies... ..	379
— directions	329, 330	— trade	379
— diseases	327	— telegraph cable	381
— foundry	326	Villano cape	173, 181, 182, 298
— Guardia road	326	— lighthouse	298
— hospitals and homes	327	— point... ..	173
— landing places	326	Villanueva cape	219
— leading marks	331	— rescue station	219
— lights	329	Villarmea point	254
— Madrid road	326	Villaviciosa	223
— new town	326	— communication	224
— old town	325	— inlet	223
— Orense road	326	— population	223
— pier	326	— tides	224
— pilots	329	Villavieja suburb	414
— point	328	Villegas, ria	210
— Pontevedra road	326	Vill-es-Martin point light... ..	93
— population	327	Vimeiro town	353
— quarantine buildings	328	Virgen del Mar hermitage... ..	201, 202
— rescue station... ..	329	— monte del	299
— repair of vessels	326	Vitré	84
— supplies	326	Vivero port	259
— telegraph cables	327	— anchorage	262
— buoys	328	— bar	261
— tides	329	— climate	261
— trade	326	— coast	261, 263
— water	326	— communication	261
— weather signals	327	— customs and quarantine	261
— wine	326	— depth of water	260
Vilaine river	84	— directions	261
— depth of water	86	— hospital	261
— directions	86	— population	260
— dock	85	— repair of vessels	261
— lights... ..	85	— supplies	261
— navigability	84	— tides	261
— pilots	86	— trade	261
— tides	86	Vizcaya province	143, 163
Villa de Conde town	336	Voleuse la	61
Villagarcia	315	Vouga river	344

	Page		Page
Wad um-er Rebia bar	455	Yesera bay	189
Wadi el Kos	450	Yeu, ile d'	99
— Sebu river, anchorage	451	— anchorage	101
— Tensift river	459	— life-boat	101
— coast	459	— lights	100, 101
Weather signals, coast of France ...	3	— pont de	100
— — — — — Portugal	7	— tides	101
West bank	146	Youch islet	22
Western Bossemen	29	Ytegin point	157
White cliff	450	Yusua rock	309
Winds, north coast of Spain 145, 164, 184			
— cape Peñas	237	Zahara village	405
— Ferrol	283	Zalgueiron rock	323
— Cadiz... ..	394	— buoy	328
— Strait of Gibraltar	438	Zezere river	358
— Cadiz to cape Trafalgar	437	Zurriola bay	150
Xeres bluff	400		

LIST OF SAILING DIRECTIONS, &c., PUBLISHED BY THE HYDROGRAPHIC DEPARTMENT OF THE ADMIRALTY, FEBRUARY 1891.

<i>Title.</i>		<i>Price.</i>	
		<i>s.</i>	<i>d.</i>
BRITISH ISLANDS.			
Channel Pilot, part 1.	South-west and south coasts of England, 7th edition, 1886 ...	3	0
	Hydrographic Notice, No. 4 of 1888	0	3
—2.	Coast of France and the Channel islands, 5th edition, 1888 ...	5	0
North Sea Pilot, part 1.	Shetland and Orkneys, 3rd edition, 1887 ...	3	0
—2.	North and east coasts of Scotland, 4th edition, 1885 ...	4	6
	Hydrographic Notice, No. 6 of 1889	0	3
—3.	East coast of England, from Berwick to the North Foreland, including the Estuary of the Thames, 5th edition, 1889 ...	4	6
—4.	Rivers Thames and Medway, and the shores of the North sea from Calais to the Skaw, 4th edition, 1887 Supplement, 1890 ...	3 0	6 6
Sailing directions for the west coast of Scotland, part 1, Hebrides or Western islands, 3rd edition, 1885 ...		4	0
Sailing directions for the west coast of Scotland, part 2, cape Wrath to the Mull of Galloway, 3rd edition, 1886...		4	0
	Hydrographic Notice, No. 4 of 1889 ...	0	3
Sailing directions for the west coast of England, from Scilly islands to the Mull of Galloway, including the Isle of Man, 4th edition, 1891 ...		6	0
	Hydrographic Notice, No. 10 of 1888...	0	2
Sailing directions for the coast of Ireland, part 1, south, east, and north coasts, 3rd edition, 1885...		3	0
	Hydrographic Notice, No. 8 of 1888 ...	0	2
Sailing directions for the coast of Ireland, part 2, south-west, west, and north-west coasts, 3rd edition, 1887 ...		3	6
	Hydrographic Notice, No. 7 of 1889 ...	0	3
NORTH OF EUROPE AND BALTIC SEAS.			
Norway Pilot, part 1.	The Naze to Christiania; thence to the Kattegat, 2nd edition, 1888 ...	4	6
—2.	From the Naze to North cape, thence to Jacob river, 1880 ...	3	0
White Sea Pilot, comprising the coast of Russian Lapland and the White sea, 1887 ...		4	6
BALTIC AND NORTH OF EUROPE.			
Danish Pilot, containing directions for the Kattegat, the Sound, Belts and channels to the Baltic, with Bornholm, and the Ertholms, 2nd edition, 1885...		5	6
Supplement, 1890 ...		0	9

<i>Title.</i>	<i>Price.</i>	
	<i>s.</i>	<i>d.</i>
Baltic Pilot, comprising the Baltic sea, the gulf of Finland, and the gulf of Bothnia, 2nd edition, 1888	5	0
Hydrographic Notice, No. 3 of 1890	0	6
ATLANTIC AND MEDITERRANEAN, &c.		
Sailing directions for the west coasts of France, Spain, and Portugal, from Ushant to Gibraltar strait, also the African coast from cape Spartel to Mogador, 5th edition, 1891 ...	4	0
Mediterranean Pilot, vol. 1. Comprising Gibraltar strait, coast of Spain, African coast from cape Spartel to gulf of Kabes, together with the Balearic, Sardinian, Sicilian, and Maltese islands, 2nd edition, 1885 ...	7	6
Supplement, 1890	0	3
2. Comprising coast of France and of Italy to the Adriatic; African coast from Jerbah to El Arish; coasts of Karamania and Syria. Together with the Tuscan archipelago, and islands of Corsica and Cyprus, 2nd edition, 1885 ...	5	0
Hydrographic Notice, No. 1 of 1889	0	3
3. Comprising the Adriatic sea, Ionian islands, the coasts of Albania and Greece to cape Malea, with Cerigo islands; including the gulfs of Patras and Corinth, 2nd edition, 1890 ...	5	6
4. Comprising the Archipelago, with the adjacent coasts of Greece and Turkey; including also the island of Candia or Crete, 1882 ...	3	6
Hydrographic Notice, No. 11 of 1885	0	1
Sailing directions for the Dardanelles, sea of Marmara, and the Bosphorus, 3rd edition, 1882	3	0
Hydrographic Notice, No. 4 of 1887	0	3
Black Sea Pilot, 3rd edition, 1884	2	6
Supplement, 1890... ..	0	8
NORTH AMERICA AND WEST INDIES.		
Remarks on Davis strait, Baffin bay, Smith sound, &c., 1875 ...	1	6
Newfoundland and Labrador Pilot. Comprising also the strait of Belle-isle, the north-east and part of the north coasts of Labrador, 2nd edition, 1887... ..	4	6
Hydrographic Notice, No. 5 of 1889	0	3
Sailing directions for the south-east coast of Nova Scotia and bay of Fundy, 3rd edition, 1885	3	0
Hydrographic Notice, No. 11 of 1888... ..	0	3
St. Lawrence Pilot, vol. 1. Containing sailing directions for the gulf and river St. Lawrence, 5th edition, 1882	3	6
Hydrographic Notice, No. 6 of 1888	0	4

<i>Title.</i>	<i>Price.</i> <i>s. d.</i>
St. Lawrence Pilot, vol. 2. Containing sailing directions for the southern parts of the gulf of St. Lawrence, and for its south entrance through Chedabucto bay and the gut of Canso, 5th edition, 1881	3 6
Hydrographic Notice, No. 2 of 1888	0 3
Sailing directions for the principal ports on the east coast of the United States of America, 3rd edition, 1882	2 6
Hydrographic Notice, No. 7 of 1888	0 8
West India Pilot, vol. 1. From cape North of the Amazons to cape Sable in Florida, with the adjacent islands, 4th edition, 1883	5 0
Revised Supplement, 1889	0 6
2. The Caribbean sea, from Barbados to Cuba, with Florida strait, Bahama, and Bermuda islands, 4th edition, 1887	9 0
Hydrographic Notice, No. 3 of 1889	0 4

SOUTH AMERICA AND PACIFIC OCEAN.

South America Pilot, part 1. East coast of South America, from cape St. Roque to cape Virgins, with the Falkland, South Georgia, Sandwich, and South Shetland islands; also the north coast from cape St. Roque to cape Orange, in French Guiana, 3rd edition, 1885	7 6
Supplement, 1890	1 0
2. Comprising Magellan strait, Tierra del Fuego, and West coast of South America from cape Virgins to Panama bay, also the Galápagos islands, 8th edition, 1886	7 6
Hydrographic Notice, No. 2 of 1890	0 4
British Columbia Pilot. Coast of British Columbia from Juan de Fuca strait to Portland canal, together with Vancouver and Queen Charlotte islands, 1888	5 6

AFRICA.

Africa Pilot, part 1. From cape Spartel to the river Cameroon, also the Azores, Madeira, Canary, and cape Verde islands, 5th edition, 1890	3 0
part 2. From the river Cameroon to the cape of Good Hope, also Ascension, St. Helena, Tristan da Cunha, and Gough islands, 3rd edition, 1884	4 6

<i>Title.</i>		<i>Price.</i> <i>s. d.</i>	
Africa Pilot, part 2. Supplement, 1889 ... ..	...	0	6
_____ part 3. South and east coasts of Africa from the cape of Good Hope to cape Guardafui, also islands in the main route through Mozambique channel, 5th edition, 1889	...	6	0
_____ Supplement, 1890. (<i>In the Press</i>).			
INDIAN OCEAN, &c.			
Gulf of Aden Pilot. Sokótra and adjacent islands, Somali and Arabian coasts in the gulf of Aden, and the east coast of Arabia, 3rd edition, 1887 ... ..	...	1	0
Red Sea Pilot. From Suez and from Akabah to the straits of Báb-el-Mandeb, and the Arabian coast, thence to Aden; also directions for the navigation of the Suez canal, 3rd edition, 1883 ...	...	4	6
_____ Revised Supplement, 1889 ... ..	...	0	6
Persian Gulf Pilot. The gulf of Omán, and the Makran coast, 3rd edition, 1890 ... ..	...	5	0
West coast of Hindustán Pilot, including the gulf of Manár, the Maldivh and Lakadivh islands, 2nd edition, 1880 ... ..	...	4	0
_____ Revised Supplement, 1887 ... ..	...	0	8
Sailing directions for Mauritius and the islands included in its Government, 1884 ... ..	...	2	0
Hydrographic Notice, No. 7 of 1887 ... ..	...	0	2
Bay of Bengal Pilot, sailing directions for the bay of Bengal, and the adjacent coasts of Hindustán, Burma, and Siam, together with Ceylon, the Nicobar, and Andaman islands, and the north coast of Sumatra, 1887 ...	...	4	6
_____ , Supplement, 1889 ... ..	...	1	0
CHINA SEA, AUSTRALIA, NEW ZEALAND.			
China Sea Directory, vol. 1. Containing approaches to the China sea, by Malacca, Singa- pore, Sunda, Banka, Gaspar, Carimata, Rhio, Varella, and Durian straits, 3rd edition, 1886 ... ..	...	4	6
_____ Supplement, 1890 ... ..	...	3	0
_____ vol. 2. Directions for the China sea between Singapore and Hong- kong, 3rd edition, 1889 ...	...	3	6
_____ vol. 3. Comprising the coasts of China, from Hong-kong to the Korea; north coast of Luzon, Formosa island and strait; the Babuyan, Bashee, and Meiaco Sima groups; Yellow sea, gulfs of Pe-chili and Liau-Tung. Also the rivers Canton, West, Min, Yung Yangtse, Yellow, Pei Ho, and Liau Ho, and Pratas island, 2nd edition, 1884 ... ..	...	6	0

<i>Title.</i>	<i>Price.</i>	
	<i>s.</i>	<i>d.</i>
China Sea Directory, vol. 3. Supplement, 1891	1	0
————— vol. 4. Comprising the coast of Korea, Russian Tartary, Japan islands, gulfs of Tartary and Amur, and the sea of Okhotsk; also the Meiac, Liukiu, Linschoten, Mariana, Bonin, Saghalin, and Kuril islands, 2nd edition, 1884	7	6
————— Revised Supplement, 1889 ..	1	0
Eastern Archipelago, part 1. Comprising the Philippines, Sulu Archipelago, north-east coast of Borneo, Celebes sea, north- east coast of Celebes, Molucca and Gillolo passages, Banda and Arafura seas, north-west and west coast of New Guinea, and north coast of Australia, 1st edition, 1890	4	6
Australia Directory, vol. 1. South and east coasts, Bass strait, and Tasmania, 8th edition, 1884	7	6
————— Revised Supplement, 1889	1	0
————— Hydrographic Notice, No. 4 of 1890	0	3
————— vol. 2. Comprising the east coast from Sydney to Torres strait. Torres strait. Coral sea. Also a part of Carpentaria gulf, 4th edition, 1889	3	6
————— Hydrographic Notice, No. 4 of 1890	0	3
————— vol. 3. North, north-west and west coasts, from the gulf of Carpentaria to cape Leeuwin, with directions for passages through the neigh- bouring seas, 2nd edition, 1881	4	6
————— Supplement, 1885	1	0
————— Hydrographic Notice, No. 10 of 1886...	0	2
————— " " No. 4 of 1890 ...	0	3
New Zealand Pilot, including also the Chatham islands, and the off-lying islands southward of New Zealand, 6th edition, 1891	6	0
Sailing directions for the Fiji islands and adjacent waters, 1882	2	0
————— Supplement No. 1, 1881	0	6
Pacific Islands, vol. 1 (Western groups). Sailing directions for the south - east, north - east, and north coasts of New Guinea, Louisiade, D'Entrecasteaux, New Hebrides, Solomon, New Ireland, New Britain, Admiralty, and Caroline islands, 2nd edition, 1890	4	6
————— vol. 2 (Central groups). Sailing directions for Kermadec, Tonga, Samoa, Union, Phoenix, Ellice, Gilbert, and Marshall islands, 1885	2	0
————— Hydrographic Notice, No. 1 of 1890 ...	0	4

<i>Title.</i>	<i>Price.</i> <i>s. d.</i>
Pacific Islands, vol. 3 (Eastern groups). Sailing directions for the Tubuai, Cook, and Society islands; Paumotu, or Low archipelago; Marquesas, scattered islands near the equator, and the Sandwich islands, 1885	2 6
_____ Hydrographic Notice, No. 12 of 1888...	0 3
Pacific ocean, Hydrographic Notice, No. 4 of 1886 ...	0 3

TABLES.

Sun's true bearing or azimuth tables (Burdwood) between the parallels of 30° and 60° inclusive, 1888 ...	4 6
--	-----

DEVIATION OF THE COMPASS, &c.

Practical rules for ascertaining and applying the deviation of the compass, 1886 ...	0 6
Admiralty manual for ascertaining and applying the deviations of the compass, 5th edition, 1882 ...	4 6

LISTS OF LIGHTS.—*Corrected annually to the 31st December.*

British islands ...	1 6
Western coasts of Europe and Africa from Dunkerque to the cape of Good Hope, including Azores, Madeira, Canary, Cape Verde islands, &c. ...	1 6
North, Baltic, and White seas ...	2 0
Mediterranean, Black, Azov, and Red seas ...	1 6
Eastern coasts of North America and Central America from Labrador to the river Amazons, also Bermuda and islands of the West Indies ...	2 6
South America, western coast of North America, Pacific islands, &c. ...	1 0
South Africa, East Indies, China, Japan, Australia, Tasmania, and New Zealand ...	2 0

TIDES.

Tide tables for British and Irish ports, and also the times of high water for the principal places on the Globe (published annually) ...	1 6
--	-----

MISCELLANEOUS.

Catalogue of charts, plans, and sailing directions, corrected annually to 31st December ...	1 0
Signs and abbreviations adopted in the Admiralty charts ...	0 6
Remarks on revolving storms, 3rd edition, 1883 ...	0 3
List of time signals established in various parts of the world, 1888 ...	1 0
Dock book, containing dimensions of the wet and dry docks, patent slips, &c., of the world, with information relating to shipbuilding and engineering works, 1890 ...	7 6
On the Station pointer, and the manner of fixing a ship's position by its aid, 1886 ...	0 6

ADMIRALTY AGENTS FOR THE SALE OF CHARTS IN THE UNITED KINGDOM.

LONDON	-	-	J. D. Potter	-	-	31, Poultry.
"	-	-	"	-	-	11, King St., Tower Hill.

SUB-AGENTS.

BELFAST	-	-	F. M. Moore	-	-	102, High Street.
BRISTOL	-	-	C. W. Price	-	-	1 and 2, Broad Quay.
COWES	-	-	C. F. Bishop	-	-	Yacht Agent.
"	-	-	Pascall, Atkey, & Son	-	-	29, High Street.
CARDIFF	-	-	E. A. Williams & Co.	-	-	3, Bute Docks.
"	-	-	H. R. Ainsley	-	-	86, Bute Street.
DARTMOUTH	-	-	R. Cranford	-	-	Library.
DOVER	-	-	C. Clout	-	-	135, Snargate Street.
DUNDEE	-	-	P. A. Feathers	-	-	40, Dock Street.
DUBLIN	-	-	Hodges, Figgis, & Co.	-	-	104, Grafton Street.
"	-	-	F. M. Moore	-	-	23, Eden Quay.
FALMOUTH	-	-	A. B. Duckham	-	-	Lloyd's Agent.
GLASGOW	-	-	D. McGregor & Co.	-	-	37, 38, Clyde Place.
"	-	-	Jas. Whyte & Co.	-	-	144, Broomielaw.
"	-	-	A. Dobbie & Son	-	-	24, Clyde Place.
GREENOCK	-	-	D. McGregor & Co.	-	-	36, Brymner Street.
"	-	-	R. Love	-	-	Havelock Buildings.
GRIMSBY	-	-	O. T. Olsen	-	-	Fish Dock Road.
HULL	-	-	R. C. Appleby	-	-	Custom House.
HARTLEPOOL	-	-	G. Pearson	-	-	21, High Street.
LEITH	-	-	D. Stalker	-	-	6, 8, Commercial Street.
LIVERPOOL	-	-	D. McGregor & Co.	-	-	72, South Castle Street.
"	-	-	Frodsham & Keen	-	-	9, St. George Crescent.
"	-	-	Graham & Parks	-	-	43, Canning Place.
"	-	-	Philip Son & Nephew	-	-	South Castle Street.
LONDON	-	-	J. Imray & Son	-	-	89, 102, Minories.
"	-	-	E. Stanford	-	-	26, Cockspur Street.
LONDONDERRY	-	-	Minniece	-	-	10, Ship Quay Street.
MARYPORT	-	-	Quintin Moore	-	-	Harbour House.
MIDDLESBROUGH	-	-	Warley, Pickering, & Co.	-	-	Docks.
NEWCASTLE-ON-TYNE.	-	-	M. S. Dodds	-	-	61, Quayside.
"	-	-	S. A. Cail & Sons	-	-	29, 31, Quayside.
NORTH SHIELDS	-	-	Wilson & Gillie	-	-	New Quay.
NEWPORT, MON.	-	-	C. & E. Williams	-	-	56, Dock Street.
OBAN	-	-	J. P. Miller	-	-	"Times" Office.
PLYMOUTH	-	-	R. W. Stevens	-	-	15, Parade.
"	-	-	T. W. Hoppins	-	-	42, Southside Street.
"	-	-	G. E. Hicks	-	-	17, Southside Street.
PORTSEA	-	-	Griffin & Co.	-	-	2, The Hard.
QUEENSTOWN	-	-	T. Miller	-	-	1, Harbour Row.
SOUTHAMPTON	-	-	S. W. Wolff	-	-	76, High Street.
"	-	-	J. B. Thomas	-	-	9, Canute Road.
SUNDERLAND	-	-	T. Reed & Co.	-	-	184, High Street West.
"	-	-	J. J. Stiles	-	-	196, High Street East.
SOUTH SHIELDS	-	-	T. L. Ainsley	-	-	Mill Dam.
SWANSEA	-	-	F. Martin	-	-	1 and 10, Somerset Place.

ADMIRALTY AGENTS FOR THE SALE OF CHARTS ABROAD.

AMSTERDAM	-	- L. J. Harri	-	-	- Prins Hendrikade, No. 90.
BERLIN	-	- D. Reimer	-	-	- 12, Anhalt Strasse.
BOMBAY	-	- A. C. Lloyd	-	-	- Apollo Street.
REMERHAVEN	-	- W. Ludolph	-	-	- Nautisches Institut.
BRISBANE	-	-	-	-	- Port Office.
CANADA	-	- Dawson Bros.	-	-	- Booksellers, Montreal.
"	-	- Hearn & Harrison	-	-	- 1640—1642, Notre Dame Street, Montreal.
"	-	- Charles Potter	-	-	- King Street, Toronto.
"	-	- Dawson & Co.	-	-	- St. Peter Street, Quebec.
CAPE TOWN	-	- Juta & Co.	-	-	- Booksellers.
CONSTANTINOPLE	-	- Giorgio Carneri	-	-	- 70, Rue Geumruck.
GIBRALTAR	-	- Rumbo & Molinary, Jr.	-	-	- Mercantile Marine Service Association.
HAGUE, THE	-	- Van Cleef Brothers	-	-	- Libraries.
HAMBURG	-	- Eckhardt & Messtorff	-	-	- Steinhof I.
"	-	- Thos. Downie	-	-	- 9, Stubbenhuk.
"	-	- Friederichsen & Co.	-	-	- 61, Neuer Wall.
HAVRE	-	- V. & M. Lepetit	-	-	- 13, 15, Rue de Paris.
HOBART	-	- Walch & Sons	-	-	- Merchants.
HONG KONG	-	- C. J. Gaupp & Co.	-	-	- Booksellers.
HONOLULU	-	- Lieut. Jackson, R.N.	-	-	-
MALTA	-	- Com. Laprimandaye,	-	-	- R.N. Port Office.
MARSEILLES	-	- A. Rabier	-	-	- 4, Quai Rive Neuve.
MELBOURNE	-	- J. Donne & Son	-	-	- 59, Elizabeth Street.
NEWCASTLE	-	- R. C. Knaggs & Co.	-	-	- Hunter Street.
NEW YORK	-	- Eggerts & Sons	-	-	- 74, Wall Street.
"	-	- Bliss & Co.	-	-	- 128, Front Street.
NEW ZEALAND	-	- W. N. Bannatyne & Co.	-	-	- Wellington.
PARIS	-	- C. & A. Jeancourt	-	-	- 224, Rue di Rivoli.
"	-	- Challamel & Co.	-	-	- 5, Rue Jacob.
SHANGHAI	-	- Lane, Crawford, & Co.	-	-	- Merchants.
"	-	- Morrison & Co.	-	-	- Do.
SINGAPORE	-	- Crawford	-	-	- Sailors' Home.
SYDNEY	-	- Bullard & Co.	-	-	- George Street.
SUEZ	-	- Capt. Weston	-	-	- Port Office.
VALPARAISO	-	- Shringley & Westcott	-	-	- Calle Cabo.
VANCOUVER ISLAND	-	- Hibben & Co.	-	-	- Victoria.
VIENNA	-	- Gerold & Co.	-	-	- Buchandlung.

LONDON:

PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
By DARLING & SON, LTD., 1-3, GREAT ST. THOMAS APOSTLE, E.C.

1891.

ABROU.

chade, Na
rasse.

stitut.

Montreal.
Notre De
real.
oronto.
t, Quebec.

uck.
ine Ser

Paris.

uve.
reet.

li.

THE UNIVERSITY OF MICHIGAN

DATE DUE

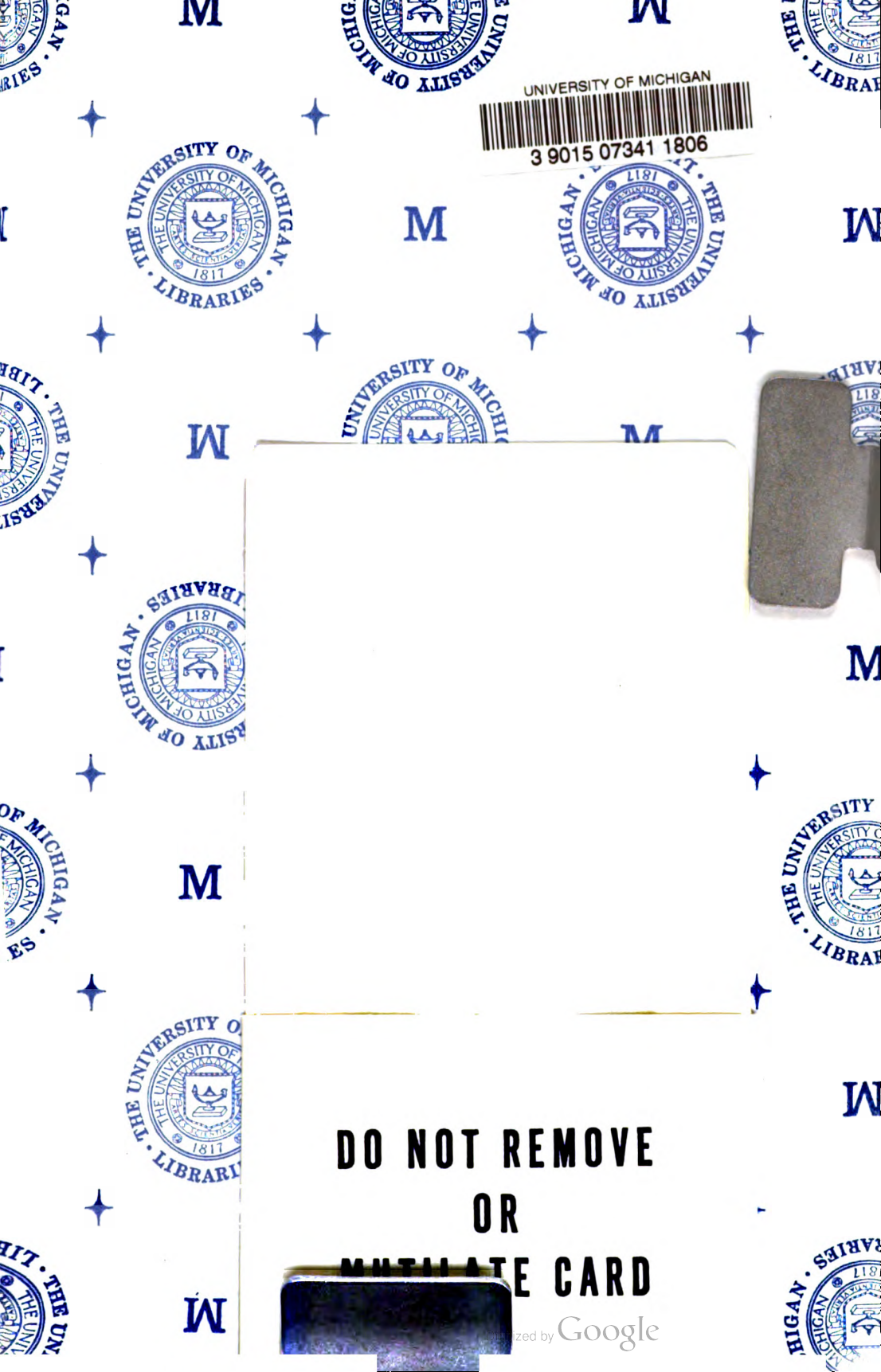
M



M



M



UNIVERSITY OF MICHIGAN
3 9015 07341 1806

**DO NOT REMOVE
OR
MUTILATE CARD**

